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ABSTRACT

Through their environments, children are exposed to a wide variety of substances that pose a risk to their health. This yearbook provides information to the public on the activities of the Environmental Protection Agency (EPA) to protect children from environmental hazards, including the latest information on the unique threats of environmental hazards to children and EPA's current efforts to combat those hazards. The yearbook includes sections on asthma and other respiratory effects, childhood cancer, developmental and neurological toxicity, health effects of pesticides, and potential risk from contaminated surface water and ground water. Additional chapters describe improvements in predicting health risks to children, highlight international activities to protect children, identify environmental education programs addressing issues of children's health, and describe EPA's expansion of individuals' and families' right to know about environment hazards. Descriptions of EPA projects include contacts for more information. The yearbook's final section directs readers to additional EPA resources for more information. (Most chapters contain references.) (KB)

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United States
Environmental Protection
Agency

Office of Children's
Health Protection
Washington, DC 20460

EPA 100-R-98-100
June 1998
www.epa.gov

The EPA Children's Environmental Health Yearbook

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Ensuring our children a safe,
healthy environment is of
paramount importance, and we
will do it with strong actions,
guided by sound science.

Vice President Al Gore

PS 029064

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

June 1998

Dear Reader.

It gives us great pleasure to share with you "EPA's Children's Environmental Health Yearbook" representing the United States Environmental Protection Agency's (EPA) current actions to protect children from environmental hazards. It contains the latest information on the unique threats environmental hazards present to children and describes EPA's efforts to combat these hazards. It is our hope that this report will be a valuable resource for the public.

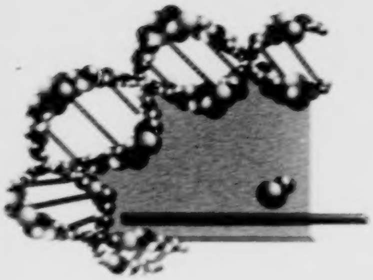
The special susceptibility of children to certain environmental hazards as well as the changing nature of childhood illness have prompted the Clinton Administration to make children's health a high priority. In September 1996. the EPA established a seven step National Agenda to Protect Children's Health from Environmental Threats. In April 1997. President Clinton issued an Executive Order requiring all federal agencies to make the protection of children a high priority in implementing their statutory responsibilities and fulfilling their overall missions. The Office of Children's Health Protection (OCHP) was created to coordinate children's health issues across EPA.

The volume and breadth of this report demonstrate the hard work taking place in the Agency to focus significant attention on protecting children's health. This work illustrates the commitment by EPA employees to safeguarding children against environmental hazards. The Clinton Administration's focus on children will continue to grow. reflecting an enduring effort to protecting the health of children.

Sincerely.

Carol M. Browner

Carol M. Browner



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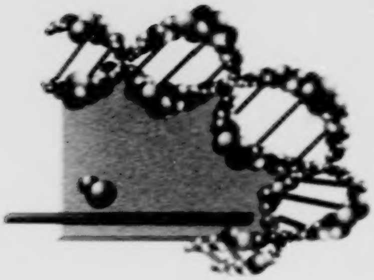

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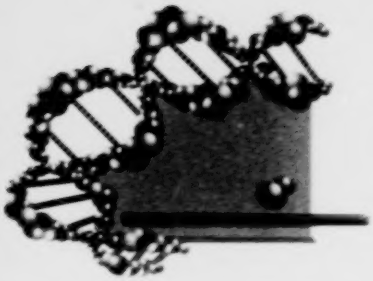

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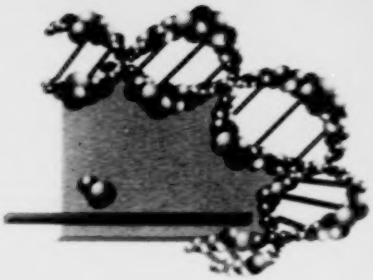

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Chapter 1

Introduction

Our Children's World

Our children live in a world much different from the one in which we were raised. In recent decades, about 50,000 synthetic chemicals have been produced in the United States and many have dispersed into the environment.(1)

Now that many of the childhood diseases prevalent in the past can be prevented or controlled with vaccines and antibiotics, there has been a shift to treating more chronic conditions. These conditions include, for example, asthma, learning disabilities, birth defects, and childhood cancers. An estimated 4.8 million children under 18 years of age have asthma.(2,3) About 150,000 children with asthma are hospitalized each year, and 600 die from the disease.(4) Asthma treatment was estimated to cost $6.2 billion in 1990; today this figure is expected to be substantially higher because of the increase in disease incidence and medical costs.(5)

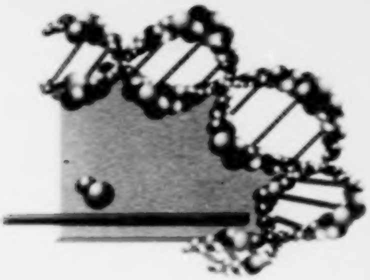
The overall frequency of childhood cancer has increased over the past two decades.(6,7) The trends in some cancer rates suggest the need for a closer examination of the underlying causes of cancer in children. This includes determining the role environmental contaminants may play in causing disease.

Special Vulnerabilities

Children may have a special vulnerability to certain toxic substances, such as lead. Their vulnerability exists for a variety of reasons. For instance, children may be more heavily exposed to certain toxic substances in the environment than adults. Pound for pound of body weight, children breathe more air, drink more water, and eat more food than adults. In addition, their behavior patterns, such as play close to the ground and hand-to-mouth activities, can increase their exposure to potential toxics in the environment. Furthermore, the systems of a child's body are still developing making children less able to metabolize, detoxify, and excrete some toxic substances than adults. However, it is not unusual for children to be less sensitive or respond differently than adults to medicines and other chemicals.(8,9) Our understanding of children's vulnerability to toxic substances is complicated because the degree of vulnerability varies with age and developmental stage.

EPA Takes Action

In recognition of these factors, Administrator Carol Browner directed the Environmental Protection Agency in the fall of 1995 to explicitly and consistently take into account environmental health risks to infants and children in all risk characterizations and public



health standards set for the United States. In the fall of 1996, the Administrator announced a seven-step *National Agenda to Protect Children's Health from Environmental Threats.*

This National Agenda Instructs the Agency to:

- Ensure that all standards set by EPA are protective of any heightened risks faced by children.
- Develop a scientific research strategy focused on the gaps in knowledge regarding child-specific susceptibility and exposure to environmental pollutants.
- Develop new, comprehensive policies to address cumulative and simultaneous exposures faced by children.
- Expand community right-to-know allowing families to make informed choices concerning environmental exposures to their children.
- Encourage parental responsibility for protecting their children from environmental health threats by providing them with basic information.
- Encourage and expand educational efforts with health care providers and environmental professionals so they can identify, prevent, and reduce environmental health threats to children.
- Provide the necessary funding to address children's environmental health as a top priority among relative health risks.

President Acts on Behalf of Children

On April 21, 1997, President Clinton signed the *Executive Order on the Protection of Children from Environmental Health Risks and Safety Risks.* This Executive Order requires all federal agencies to assign a high priority to addressing health and safety risks to children, coordinate research priorities on children's health, and ensure that their standards take into account special risks to children. The Executive Order creates a Task Force on Environmental Health Risks and Safety Risks to Children that will establish a coordinated research agenda and enlist public input for these efforts.

EPA Launches New Office

In May 1997, Administrator Browner established the Office of Children's Health Protection (OCHP) to support the Agency as it implements the President's Executive Order as well as the *National Agenda to Protect Children's Health from Environmental Threats.* The mission of OCHP is to make the protection of children's health a fundamental

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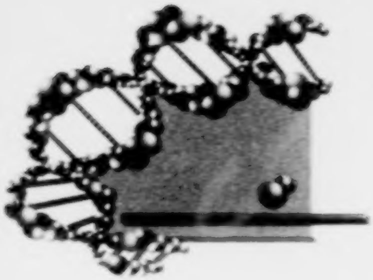

goal of public health and environmental protection in the United States. OCHP will support and facilitate Agency efforts to protect children's health from environmental threats. This *Children's Environmental Health Yearbook* highlights EPA activities that protect children's health from environmental hazards and is among the first projects of the new office.

Office of Children's Health Protection Highlights

- EPA Administrator, Carol Browner, convened the first federal conference addressing the preventable causes of childhood cancer on September 15 and 16, 1997. Recommendations for a research agenda included a call for a National Childhood Cancer Registry and standardizing information, such as exposure history and family health data.
- EPA and the Department of Health and Human Services (HHS) are establishing federally funded research centers dedicated to the protection of children's health from environmental threats. The centers will focus on the environmental causes of children's illnesses and disorders. They will seek an understanding of the mechanisms of respiratory disease, such as asthma, and they will study the effects of environmental contaminants, such as lead, mercury, and polychlorinated biphenyls (PCBs), on intellectual and physical development. Also, they will institute new community-based partnerships for prevention.
- The Office of Children's Health Protection chairs an EPA Board on Children's Environmental Health that will ensure the integration of Agency activities affecting children and serve as a catalyst for actions that will protect children.
- Administrator Browner and Health and Human Services Secretary Donna Shalala co-chair the Task Force on Environmental Health Risks and Safety Risks to Children. On October 9, 1997, the Task Force met to implement President Clinton's Executive Order. Work groups were established to coordinate federal data needs and research and to facilitate children's environmental health programs across the federal agencies.
- A Federal Advisory Committee on Children's Health Protection has been established. This broad-based committee will advise EPA on children's environmental health issues as it develops regulations, guidance, and policies; communicates with the public; and conducts research.

EPA has already begun to fulfill the requirements of the National Agenda and Executive Order. Some of the more visible examples include certain updated air quality standards, implementation of the 1996 Safe Drinking Water Act (SDWA) Amendments, and the 1996 Food Quality Protection Act Amendments to the Food Drug and Cosmetic Act.

- The Clinton Administration's 1997 air standards for particulate matter and ozone provide additional health protection to 35 million children and set standards for fine particulate matter for the first time.(10) The strengthening of the ozone standard is expected to result in one million fewer incidents of decreased lung function in children each year.(11)

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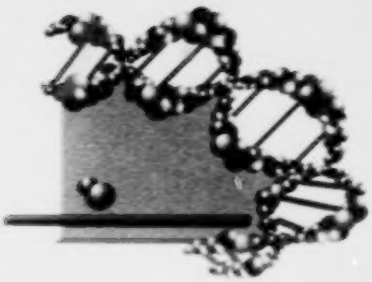

- The 1996 Food Quality Protection Act contains specific provisions to protect the health of infants and children in the absence of complete data on the harmful effects of pesticides. It also calls for the re-evaluation of nearly 10,000 existing pesticide tolerances within a ten-year period. Pesticide tolerances are the levels of pesticide residues that the government allows in food.
- The 1996 SDWA Amendments include a new focus on setting priorities based on risk. EPA will decide which waterborne contaminants to regulate under the SDWA based on data about the health risks the contaminant may pose, its likely occurrence in public water systems, and the projected benefit of reducing the risk. EPA will identify groups of sensitive people, called subpopulations, who are at greater risk than the general public from exposure to drinking water contaminants. These sensitive subpopulations include infants, children, pregnant women, the elderly, and people with weakened immune systems. The goal is to protect the people who are most sensitive to each contaminant and assure that the health of children is protected.
- The principles of environmental justice—that all people must have the opportunity to live in a healthy environment and that environmental laws apply without discrimination based on race, ethnicity, culture, or economic status—guide EPA's efforts to increase and improve access to education programs for the poor, immigrants, and ethnic and racial minorities. A great many EPA children's health projects target urban environmental problems and tribal health threats.

Organization of this Report

The *EPA Children's Environmental Health Yearbook* is meant to be a resource guide of EPA activities for the public and a tool for the Agency to use in protecting children's health from environmental hazards. The *Yearbook* includes sections on asthma and other respiratory effects; childhood cancer; developmental and neurological toxicity; health effects of pesticides; and potential risk from contaminated surface water and ground water. Additional chapters describe improvements in predicting health risks to children, highlight international activities to protect children, identify environmental education programs addressing issues of children's health, and describe EPA's expansion of individual's and families' right-to-know about environmental hazards.

Each chapter outlines EPA efforts to address potential environmental health threats. EPA projects may relate to more than one health effect or risk. For instance, even though most of the environmental tobacco smoke projects are summarized in the chapter on asthma and respiratory effects, the same projects are also relevant to the childhood cancer chapter.

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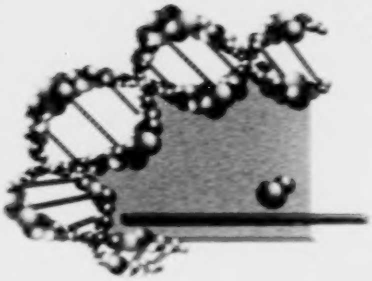
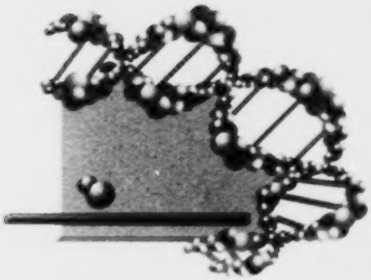


The brief descriptions of EPA projects include contacts for more information. The final section directs readers to additional EPA resources for more information.

The *Yearbook* identifies areas where research has established a link between a harmful health effect and exposure to a contaminant. Two examples are the effect of lead on the brains of young children and of nitrates on the oxygenation of infants. The *Yearbook* also includes a discussion of environmental contaminants where a link between exposure and adverse health effects may only be suspected in children—not proven, especially at the low levels of contamination generally found in the environment. Harmful effects from exposure to contaminants during childhood might not manifest themselves until later in life.

EPA is focusing significant attention on protecting children's health, as demonstrated in this *Yearbook*. However, much basic and applied research remains to be done to establish or refute links between exposure to environmental factors and specific health effects. EPA is conducting research to better understand and prevent environmental health risks.



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CHAPTER 2

ASTHMA AND OTHER RESPIRATORY EFFECTS

DEFINITION

Asthma is a narrowing of the airways in the lung that produces difficulty in breathing. Asthma attacks are commonly set off by "triggers" in children who have a genetic or acquired predisposition to the disease. Several major triggers are household dust mites (microscopic insects that live on dust), certain foods, lung and upper airway irritants (such as cigarette smoke, smog, soot, and pollen), strong fumes, respiratory infections, cold or windy weather conditions, and, occasionally, emotions or exercise that cause deep or rapid breathing.(1) The triggers may set off a chain of reactions leading to a narrowing of the airways in the lung and inflammation of mucus membranes. These reactions, in turn, cause coughing, wheezing, chest tightness, shortness of breath, and increased risk of respiratory infections. Asthmatic episodes may last for hours or several days, and severely restrict the ability of a child to live a normal life.

Childhood Asthma Facts

- An estimated 4.8 million children under 18 years of age have asthma and many more have hidden, or undiagnosed, asthma.(2,3)
- Asthma is the leading chronic illness in children of the United States and the leading cause of school absenteeism due to chronic illness.(4)
- Six hundred children die each year from asthma, and 150,000 are hospitalized.(5)
- From 1980 to 1993, the death rate for childhood asthma in the United States increased by 78 percent.(5)
- Asthma treatment cost an estimated $6.2 billion in 1990.(6)
- Asthma-related hospitalizations have risen disproportionately for inner-city children, and in particular for minority populations.(7,8)

Childhood asthma is a disorder with genetic predispositions and a strong allergic component. Approximately 75 to 80 percent of children with asthma have significant allergies.(1) Allergens, such as household dust mites, tobacco, pet dander, insects, molds, and pollen, are substances that may trigger allergic reactions and subsequent asthma attacks.

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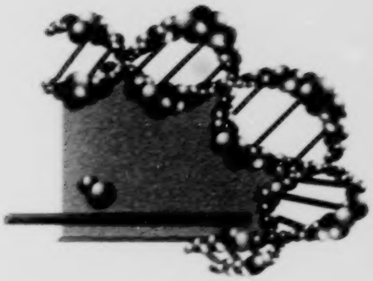


Possible Environmental Factors

Poor indoor and outdoor air quality have been linked with asthma symptoms as well as with other respiratory problems, such as an increased frequency of respiratory infections, bronchitis, and pneumonia in children.(8)

Indoor Air Pollutants

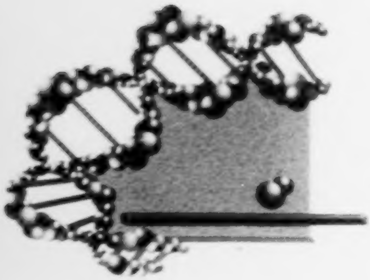
People in industrialized nations spend 90 percent of their time indoors.(9) The home, school, and daycare center where children spend most of their time are the locations of highest concern for exposure to indoor air pollutants. A recent series of Government Accounting Office (GAO) reports found that both new and old primary and secondary school buildings need rehabilitation. Older buildings often contain materials with hazardous substances, such as asbestos and lead. Newer buildings and furnishings may contain formaldehyde and strong fumes. Several of the most common indoor air pollutants in homes, schools, and daycare centers are described below.

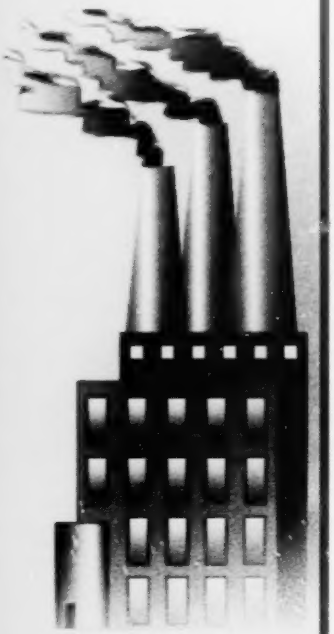
Environmental Tobacco Smoke (Secondhand Smoke)

The Centers for Disease Control and Prevention's (CDC) National Center for Environmental Health reports that 43 percent of children, two months through 11 years of age, live in a home with at least one smoker.(10) Children who live with smokers involuntarily inhale many pollutants in smoke. Environmental tobacco smoke (ETS), also known as secondhand smoke, is a complex mixture of more than 4,000 chemicals, including carbon monoxide, nicotine, tars, formaldehyde, and hydrogen cyanide.(11) Several of these chemicals are known human carcinogens or respiratory irritants.(12)

Children exposed to ETS tend to have more bronchitis, pneumonia, respiratory infections, otitis media (fluid in the middle ear), and asthma symptoms.(13) The frequency of infection depends directly on the amount of smoke in the home. Children who live with two smoking parents have more respiratory infections than children who live with one smoking parent. The lowest rates of respiratory infections and asthma are found in children of parents who do not smoke at all. Maternal smoking during pregnancy is associated with an increased incidence of Sudden Infant Death Syndrome.(13,14,15)

EPA estimates that between 150,000 and 300,000 cases of lung infections, such as bronchitis and pneumonia, that occur annually in infants and young children up to 18 months of age may be attributed to exposure to ETS. Of these, 7,500 to 15,000 will result in hospitalization.(13) ETS exposure aggravates the condition of between 200,000 and 1,000,000 asthmatic children.(14) EPA has found that ETS increases fluid in the middle ear, a sign of chronic middle ear disease, the most common cause of hospitalization for surgery in children.(13)





The CDC estimates that children exposed to tobacco smoke in their homes have 18 million more days of restricted activity, 10 million more days of bed confinement, and miss 7 million more school days annually than other children, primarily due to acute and chronic respiratory conditions.(16)

Allergens

Allergens, especially those containing biological matter, such as house dust mites, cockroaches, pet dander, pollen, molds, spores, bacteria, and viruses, are known to cause or aggravate asthma.(1) Allergic reactions often combine with and seriously aggravate the symptoms of asthma, the common cold, pneumonia, and other conditions. Allergens also may cause eye, nose and throat irritation, shortness of breath, dizziness, lethargy, and fever.

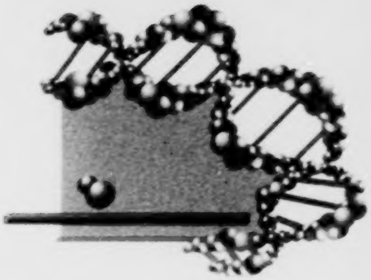
Volatile Organic Compounds

Volatile organic compounds (VOCs) are chemicals that can volatilize (evaporate) from substances, such as cleaning products, adhesives, paints, dry-cleaning fluids, and wood preservatives.(17) VOCs can be emitted from these products into the air and may be trapped indoors, especially in tightly sealed buildings. An EPA study of six communities in various parts of the United States found that indoor levels of VOCs are up to ten times higher than outdoor levels. Symptoms of VOC exposure may include eye, nose and lung irritation, rash, headache, nausea, vomiting, and asthma. Exposure to some VOCs, such as benzene and vinyl chloride, may cause cancer.

Formaldehyde, a common VOC, is a colorless, strong-smelling gas used in pressed wood (particle board, fiberboard, and plywood), paints, coatings, cosmetics, fabrics, and insulation materials.(18) Formaldehyde is released into the air from these products as well as from burning wood, kerosene, or natural gas, and from automobiles and cigarettes. Formaldehyde causes cancer in laboratory animals and is considered by EPA to be a probable human carcinogen. Although formaldehyde affects people differently, it may irritate the eyes, nasal sinuses, throat, and lungs, and may trigger asthma. Children and adults have developed allergic reactions, including hives, from exposure to the gas.

Nitrogen Oxides

Nitrogen oxides are more often thought of as outdoor air pollutants emitted by motor vehicles and fossil-fuel burning power plants, but they also are found indoors. Inadequately vented gas ranges, gas pilot lights, gas or kerosene heaters, and welding activities, as well as tobacco smoke, contribute to nitrogen oxides in indoor air. Because they are potent respiratory irritants, they may aggravate asthma and other respiratory diseases.(19)

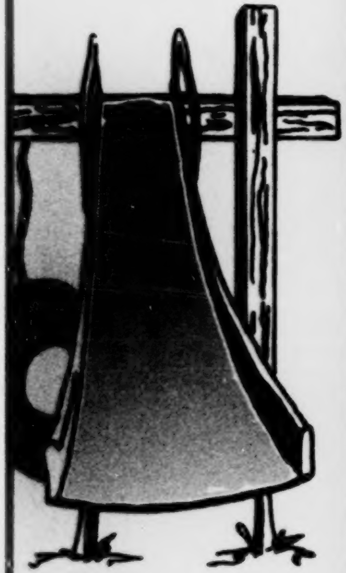


Carbon Monoxide

Carbon monoxide is a colorless, odorless gas produced from the incomplete burning of virtually any combustible product. It may accumulate indoors as a result of tobacco smoking, poorly ventilated appliances, and attached garages.

Carbon monoxide enters the blood from the lungs and combines with hemoglobin, blocking the blood's ability to carry oxygen to body cells. Symptoms of carbon monoxide exposure may mimic influenza and include fatigue, headache, dizziness, nausea and vomiting, mental confusion, and rapid heart rate. Depending on the level of exposure, carbon monoxide can be immediately fatal. Long-term, low-level exposures to carbon monoxide by pregnant women have the potential to injure the developing fetus.(20)

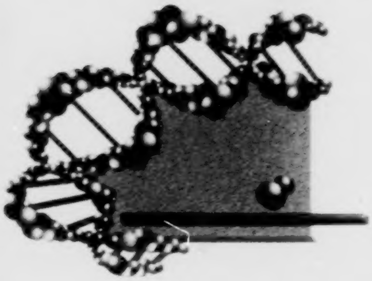
Outdoor Air Pollutants

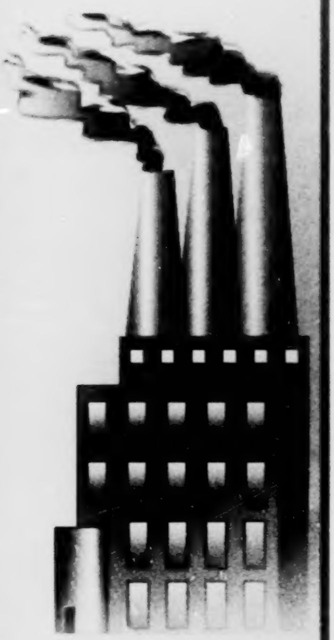


Urban air pollution appears to be a contributor to current increases in asthma incidence. In 1995, thirty-three percent of the U.S. population lived in counties that did not meet EPA air quality standards for ozone (the principal component of smog), carbon monoxide, nitrogen dioxide (one of the nitrogen oxides), sulfur dioxide, particulate matter (soot), and lead.(21) Although any of the outdoor air pollutants may play a role in increased asthma attacks, ozone is the pollutant consistently associated with aggravating the disease. High ozone levels also are associated with a reduction in lung function in children without asthma.(22) The American Lung Association determined that children with asthma are 40 percent more likely to suffer asthma attacks on high-pollution days compared to days with average pollution levels.

A recent study linked exposure to particulate matter with an increased risk of death to newborns from respiratory problems and Sudden Infant Death Syndrome.(23)

Children are especially vulnerable to the effects of ozone and particulate matter.(24,25) Except for the very young, children typically spend more time outdoors than do adults, especially in the summer when ozone and particulate levels are the highest. Children also spend more time engaged in vigorous activity, which results in more outside air being taken into their lungs. Their activity, combined with the higher breathing rate of children relative to their body weight and lung surface area, results in a greater dose of pollutant delivered to their lungs. Air pollution that would produce only slight breathing difficulties in an adult may contribute to a more serious breathing problem in a young child because children have smaller airways.





Summary of EPA Activities

Improving Indoor Air Quality (IAQ)

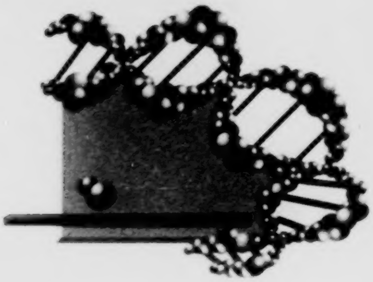
EPA has joined with numerous nonprofit organizations, states, and educational systems to develop indoor air quality programs that offer workshops, distribute educational materials, and conduct media campaigns, home audits, and school inspections. EPA has developed an easy-to-use guide called the *Indoor Air Quality (IAQ) Tools for Schools Action Kit*. The kit empowers schools to carry out a practical plan of action to prevent and resolve indoor air quality problems at little or no cost using simple activities and in-house staff. Extensive efforts are underway by EPA regional offices to distribute the *IAQ Tools for Schools* materials and assist schools in implementing an IAQ program.

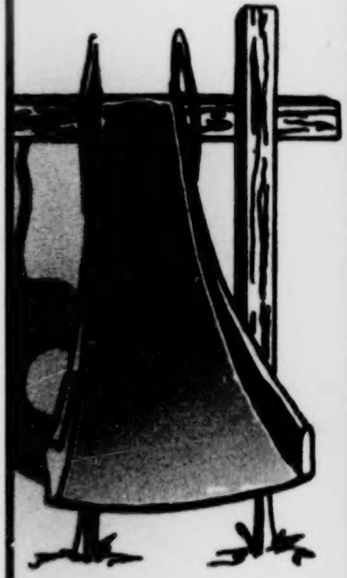
Many national advocacy organizations are promoting the kit as an easy and effective program for minimizing adverse health effects. With more than 20,000 kits distributed nationwide since 1996 to kindergarten through high schools, strong support for the program has been voiced by state departments of education and health. Several state legislatures are using the kit as a guide to develop indoor air quality standards in schools.

To determine whether *IAQ Tools for Schools* is improving air quality, EPA is measuring changes in symptoms, staff perceptions of the quality of indoor air, reductions in pollutant levels, and improvements in ventilation system performance. Participating schools undergo before-and-after testing over a one-year period. Throughout the year, EPA monitors the progress of specific activities, as well as their costs.

EPA also is working with the American Lung Association to implement the *Open Airways* program among high-risk, inner-city minority children who have higher-than-average asthma death rates. The *Open Airways* curriculum teaches children to manage their own symptoms and has been completed by over 22,000 children. This year, *Open Airways* training will be combined with the *IAQ Tools for Schools* program. Training will result in an additional 25,000 children graduating from the *Open Airways* program and 1,500 schools implementing the *IAQ Tools for Schools* guidance.

EPA is collaborating with the U.S. Department of Health and Human Services to educate the public about the dangers of ETS and has embarked on a national public education campaign designed to reduce children's exposure to ETS. EPA has enlisted the help of daycare operators and pediatricians in educating parents about the dangers of ETS in the home. They also are teaching parents about techniques for avoiding exposure to substances that may trigger asthma and other respiratory illnesses.





Although much is known about typical childhood activity patterns, less is known about the physical characteristics of children's lungs that make them more susceptible to the effects of airborne pollutants. EPA is conducting various studies to improve the understanding of this relationship.

Improving Outdoor Air Quality

EPA's efforts to control outdoor air pollution are focused on protecting everyone, including children, from the harmful effects of ozone, particulate matter, and toxic substances. The Agency develops standards that set safe limits for the most prevalent air pollutants, and works with the states to implement those standards. In July 1997, the Clinton Administration strengthened the ozone standard from 120 parts per billion (ppb) averaged over one hour to 80 ppb averaged over eight hours. This new limit was proposed to respond to scientific evidence that previous standards, established 20 years ago, do not adequately protect sensitive populations such as asthmatics and children, from the effects of ozone. These new regulations also established standards for fine airborne particles for the first time. EPA estimates that the new standards will save at least 15,000 lives per year and protect an additional 35 million children.

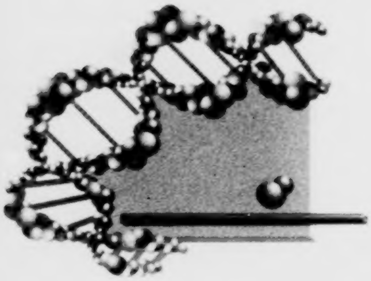
EPA's regional offices have begun various outreach efforts to emphasize the increased susceptibility of children to certain air pollutants—particularly ground-level ozone. These efforts include daily Internet postings on predicted air quality ratings, health effects fact sheets (available in several languages), and media campaigns. The air in schools in industrial areas is being monitored to further identify and measure air contaminants.

EPA is measuring the impact of outdoor air pollutants on the physical development of children. For example, the Agency is investigating the effects of inhaling ground-level ozone, fine particulate matter, and other air pollutants over a long time. Other research efforts include examining the effects of air emissions from fossil fuel combustion and residential wood-burning, and identifying effects of air toxics on pregnancy.

EPA Projects on Asthma and Other Respiratory Effects

Indoor Air Quality (IAQ) Tools for Schools

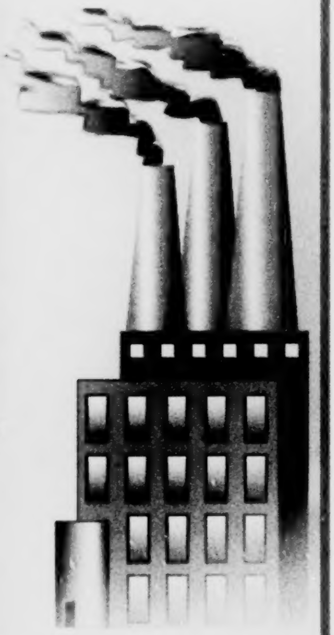
Title:	Indoor Air Quality Tools for Schools
Description:	EPA has developed *IAQ Tools for Schools*, an easy-to-use guidance intended to empower schools to prevent and resolve IAQ problems at little or no cost using simple activities and in-house staff. More than 20,000 *IAQ*



Tools for Schools kits have been distributed nationwide since 1996. The program is directed from EPA headquarters through agreements with a number of associations, such as the National PTA, American Association of School Administrators, and National Education Association. EPA's regional offices have active implementation programs as well.

Partners: National PTA, National Education Association, Association of School Business Officials, Council for American Private Education, American Federation of Teachers, and American Lung Association

Contact: Office of Air and Radiation, John Guevin, 202-564-9055



Title: American Association of School Administrators

Description: EPA is working cooperatively with the American Association of School Administrators (AASA) to enable schools to prevent and resolve IAQ problems using the *IAQ Tools for Schools Action Kit*. This project includes training courses, IAQ sessions during workshops and conferences, and articles in newsletters to educate administrators about IAQ problems and solutions, as well as how to implement an IAQ program using in-house school staff. AASA will conduct periodic surveys during the project to assess the administrators' understanding of IAQ and problem resolution.

Partners: American Association of School Administrators

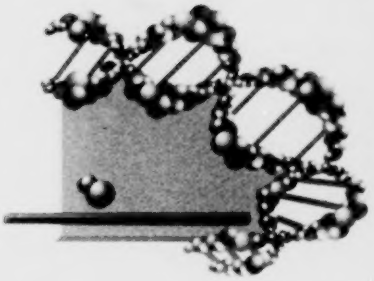
Contact: Office of Air and Radiation, Susan Dolgin, 202-564-9048

Title: National Education Association

Description: The National Education Association Health Information Network (NEA HIN) and EPA are supporting NEA's 2.2 million members in improving the management of IAQ in schools and homes. Under NEA's training program, 51 NEA members and 16 union liaisons were trained in school IAQ management. Trainees and workshop participants are currently working with 38 school districts and 32 schools to implement EPA's *IAQ Tools for Schools*.

Partners: National Education Association

Contact: Office of Air and Radiation, Matt Hiester, 202-564-9459



Title: National Parent Teachers Association

Description: The National Parent Teachers Association (NPTA) and EPA are working cooperatively to support the participation of over 6.5 million PTA members in the environmental management of homes, schools, communities, and ecosystems. Sixteen state PTA leaders were trained on school indoor air quality, air pollution, water pollution, drinking water quality, hazardous materials, emergency planning, radon exposure, pesticides, solid waste, and lead poisoning. These trainees have secured commitments from 71 other PTA members to encourage their school district to implement EPA's *IAQ Tools for Schools Action Kits* in addition to other efforts. An additional 36 state PTA leaders received comprehensive environmental training in August 1997.

Partners: National Parent Teachers Association

Contact: Office of Air and Radiation, Tracy Washington-Enger, 202-564-9484

Title: Regional *IAQ Tools for Schools* Programs

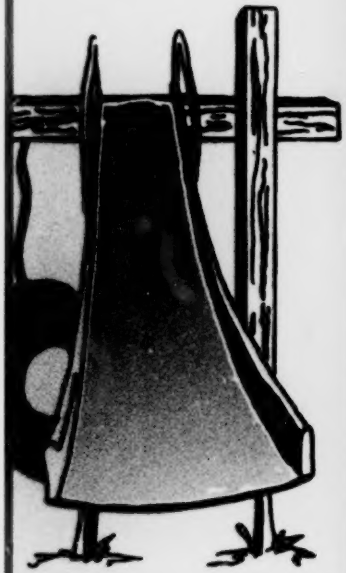
Region 1: The Region has distributed *IAQ Tools for Schools* to more than 1,000 schools. Contact Mary Beth Smuts, 617-565-3232.

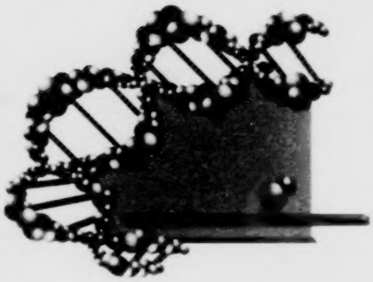
Region 2: Working with the Environmental Sciences Training Center at Rutgers University, Region 2 is training school personnel, including nurses. Regional staff have developed a mentoring program for schools planning to implement the kit, and will accompany school personnel in building inspections. Contact Rachel Chaput, 212-637-4001.

Region 3: Region 3 is training maintenance workers in the Baltimore public schools. Participating schools will evaluate the effectiveness of the program. Contact Reggie Harris, 215-566-2988.

Region 4: Together with the University of Tulsa, Region 4 presented five workshops attended by approximately 250 school officials, and distributed 1,400 kits. Contact Henry Slack, 404-562-9143.

Region 5: A series of workshops have been held through grants to states and nonprofit organizations, and regional staff developed a mentoring program for schools planning to implement the kit. Contact Phyllis Reed, 312-886-6018.



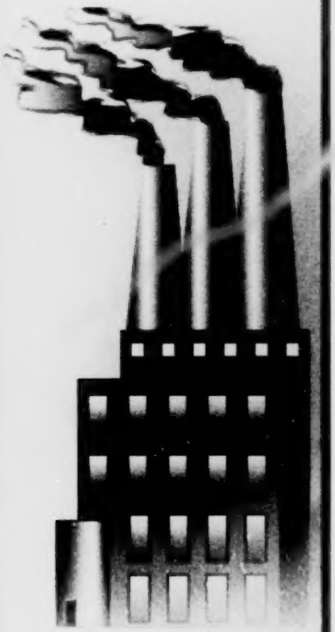


Region 6: Approximately 300 school administrators, physical plant staff, school nurses, and public health officials from 103 school districts participated in seven one-day workshops. Contact Joyce Stanton, 214-665-8377.

Region 7: Workshops have been held throughout Region 7 to demonstrate the benefit of healthy indoor air in the school environment. Contact Tom Hogan, 913-551-7684.

Region 8: The Region conducted a pilot program with North Dakota and South Dakota to provide workshops. In Montana, 357 schools are implementing the program. Contact Kathleen Craig, 303-312-6031.

Region 9: Region 9 is providing outreach material and workshops, and is developing a pilot demonstration project in Alameda County, California, in cooperation with county health officials, school administrators, and health professionals. Contact Barbara Spark, 415-744-1132.



Title: Urban Schools Initiative

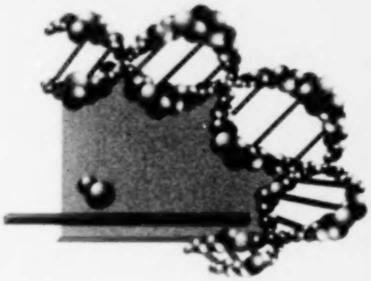
Description: The Urban Schools Initiative demonstrates how significant IAQ problems in an urban school can be cleaned up to reduce health risks and improve the learning environment for children. Planned structural improvements at a school in Washington, DC, include removal and replacement of moldy walls and ceilings, ventilation system repairs and upgrades, abatement of lead-based paints, repair of steam system and plumbing leaks, and replacement of moisture-damaged windows. Changes resulting from IAQ improvements will be measured at the beginning and end of the project. Training of all DC school facilities managers on EPA's *IAQ Tools for Schools* is an integral part of the initiative.

Partners: Washington, DC public school system

Contact: Office of Air and Radiation, Bob Thompson, 202-564-9056

Title: School Intervention Study

Description: The School Intervention Study will provide a measure of the effectiveness of EPA's *IAQ Tools for Schools* guidance in improving the management of school buildings for better IAQ. Success measures include problem prevention activities, changes in staff symptoms and perceptions of indoor air quality, pollutant reduction, and ventilation system improvements.



Before-and-after testing is being conducted in several schools and costs will be monitored over a one-year period.

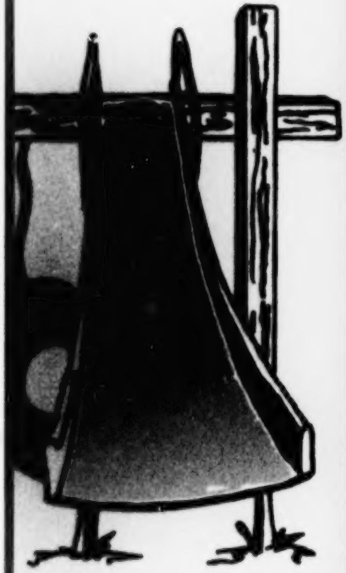
Contact: Office of Air and Radiation, Brian Ligman, 202-564-9432

Title: American Lung Association *Open Airways*

Description: The American Lung Association is promoting EPA's *IAQ Tools for Schools* along with their *Open Airways* curriculum, which teaches asthmatic elementary school children to manage their own asthma. The program emphasizes inner-city children with higher than average death rates. The American Lung Association is developing an integrated training program in which 15 master trainers will train 250 other trainers who will then train 5,000 local volunteers. Project directors estimate that this combined program will result in 25,000 children graduating from *Open Airways* and 1,500 schools fully implementing the *IAQ Tools for Schools* guidance. The program has enhanced asthma management skills of children and their parents, reducing the frequency of asthma attacks. Several regions are translating *Open Airways* into Spanish. Additionally, local American Lung Associations purchased over 5,000 EPA *IAQ Tools for Schools* kits last year to promote in schools.

Partners: American Lung Association, Zeta Phi Beta Sorority

Contact: Office of Air and Radiation, Denise Settles, 202-564-9704; Office of Enforcement and Compliance Assurance, Marty Halper, 202-564-2601

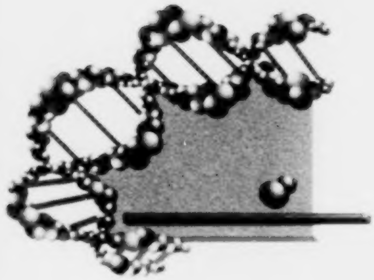


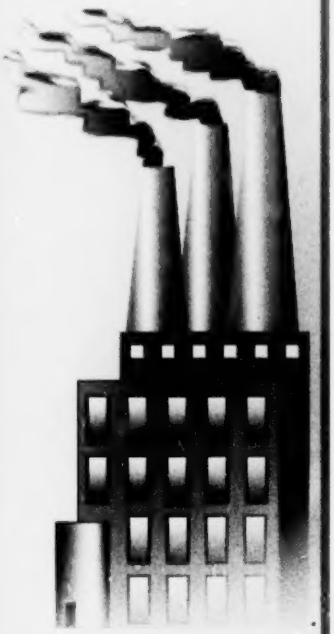
Title: Training School Nurses in *Open Airways* and *IAQ Tools for Schools*

Description: EPA, along with the New York State American Lung Association (ALANYS), has taken advantage of the need for school nursing recertification by incorporating training in *Open Airways* and *IAQ Tools for Schools* into the recertification requirements. School nurses are trained and then encouraged to conduct training in these two programs within their own schools. Over 75 percent of the school nurses in New York State, outside of New York City (1,526), have been trained. Nearly 180 nurses requested the *Open Airways* kit and more than 70 school nurses have completed at least partial implementation of the program within their schools.

Partners: New York State American Lung Association

Contact: Region 2, Rachel Chaput, 212-637-4001





Environmental Tobacco Smoke (Secondhand Smoke)

Title: ETS Media Campaign

Description: EPA, the Consumer Research Council, and the American Medical Association are working together to develop, disseminate, and promote a public communications campaign designed to reduce children's exposure to ETS.

Partners: Consumer Research Council and the American Medical Association

Contact: Office of Air and Radiation, Bill Long, 202-564-9733

Title: Reducing Exposure to ETS through Child Care Outreach

Description: EPA is implementing training developed by the Pennsylvania Chapter of the American Academy of Pediatrics (AAP-PA) in at least five state systems this year. The program trains daycare center operators on the risks to children from exposure to ETS at home. The AAP-PA has provided professional credits to 160 providers who passed an exam and implemented the program, resulting in an estimated 1,920 families who have reduced their children's risk from ETS.

Partners: American Academy of Pediatrics Pennsylvania Chapter and National Resource Center for Health and Safety in Child Care

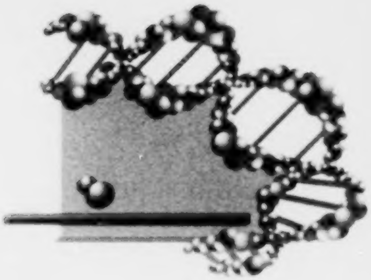
Contact: Office of Air and Radiation, Bill Long, 202-564-9733

Title: Community-Based Pediatrician Outreach

Description: The American Academy of Pediatrics (AAP) is collaborating with EPA to develop and promote the use of public information materials on the risks of ETS and other indoor air pollutants. A speaker's kit for pediatricians to use in community-based risk reduction efforts is being developed. The kit is designed to communicate the health risks to children from involuntary exposure to ETS. The program's goal is to have 150 pediatricians participate in community-based risk reduction projects using these materials.

Partners: American Academy of Pediatrics

Contact: Office of Air and Radiation, Bill Long, 202-564-9733



Title: Indoor Air Environment Program for Children

Region 1: With the American Lung Association and the Asthma and Allergy Foundation, Region 1 is developing home-audit checklists on asthma and carbon monoxide dangers and prevention. They also have developed and implemented the Program on Asthma and Clean Air for Daycare Providers. Five workshops have been held, reaching 125 daycare operations. Contact Mary Beth Smuts, 617-565-3232.

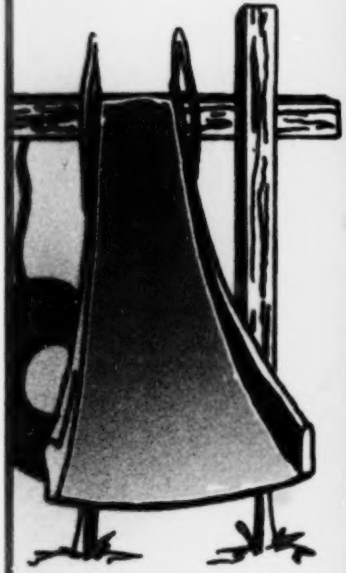
Region 2: With the American Lung Association, Region 2 is implementing the Child Care Outreach project in New York State. The project reaches households with children under six through daycare centers to reduce the number of households in which children are regularly exposed to tobacco smoke. Contact Larainne Koehler, 212-637- 4005.

Region 4: An outreach program for parents of young children and other care givers in Region 4 will reduce ETS exposure of 500,000 children in two states. Materials will be distributed to daycare centers, new parents, preschools, radio stations, and other forums. Contact Henry Slack, 404-562-9143.

Region 7: In cooperation with the American Lung Association of Kansas and the Kansas Department of Health and Environment, the Region will implement the Child Care Outreach project and provide 10,400 child care centers with educational materials about the hazards of ETS. Contact Tom Hogan, 913-551-7684.

Region 8: In cooperation with the American Lung Association, Region 8 is implementing the Child Care Outreach project and has developed a required training program on indoor air quality and ETS for daycare center providers applying for state certification. Contact Lon Hesla, 303-312-6024.

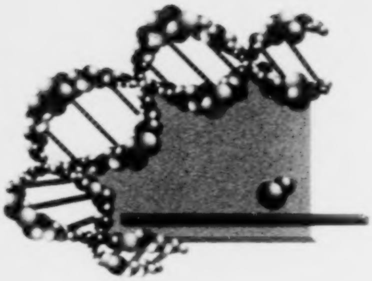
Region 9: Region 9 is working with the American Lung Association to promote use of the Child Care Outreach and Secondhand Smoke Education Projects by daycare providers. Contact Louise Hill, 415-744-1046.

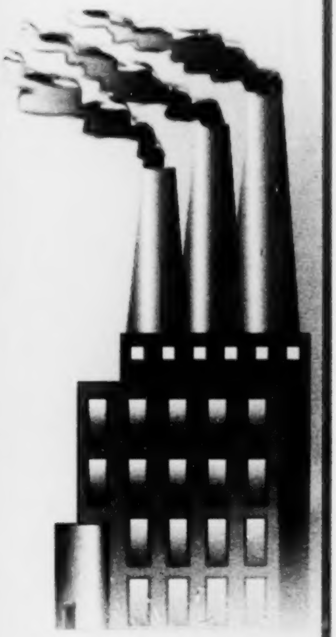


INDOOR AIR OUTREACH AND INTERVENTION

Title: Harlem Prevention Center Community University Partnership Grant

Description: The Harlem Prevention Center, in conjunction with Columbia University scientists and the West Harlem Environmental Action Community-based





organization, is reaching out to the community in several inner-city areas within New York City. Through an interactive dialog between the scientists and community, environmental issues of concern will be identified. Environmental testing and monitoring will be done where necessary to accumulate relevant exposure data.

Partners: Columbia University School of Public Health and West Harlem Environmental Action Group

Contact: Region 2, Rachel Chaput, 212-637-4001

Title: "Breathe Easier" Support

Description: Working with the Dimmock Community Health Center in Dorchester, MA, EPA has supported the establishment of an asthma educational outreach initiative, Breathe Easier. Conducted by community health activists and teen leaders, the project is directed toward children with asthma in four public housing units. Educational tools developed through this program include a video and an information packet on asthma. These materials address what to do during an asthma attack, how to properly take medication, and how to identify asthma triggers.

Partners: Dimmock Community Health Center

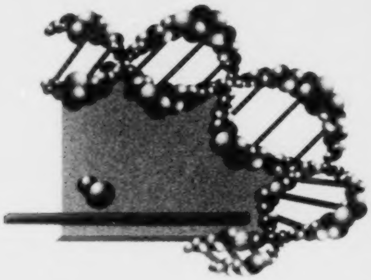
Contact: Region 1, Lois Adams, 617-565-3487

Title: AmeriCorps Outreach on Asthma

Description: EPA Region 1 is training AmeriCorps workers to provide asthma and carbon monoxide home inspections for inner-city families. Forty AmeriCorps volunteers will conduct the inspections for families with young children and provide them with "asthma control bedding" and carbon monoxide detectors as needed. AmeriCorps staff also provide environmental education to fourth- and fifth-grade classrooms and to after-school students.

Partners: AmeriCorps and County Occupational Safety and Health Departments

Contact: Region 1, Mary Beth Smuts, 617-565-3232



Title: "Home Cleaning for Asthma Attack Control" Program

Description: EPA Region 7 is working with the American Lung Association of Eastern Missouri (ALAEM) to implement the "Home Cleaning for Asthma Attack Control" program. ALAEM is developing a workbook showing step-by-step actions to remove the precursors, or triggers, that commonly cause asthma attacks. The workbook will be oriented to low-income apartment dwellers and home owners with school-age children. ALAEM also plans to develop a video that will follow the outline of the workbook, demonstrating and further explaining its recommendations.

Partners: American Lung Association of Eastern Missouri

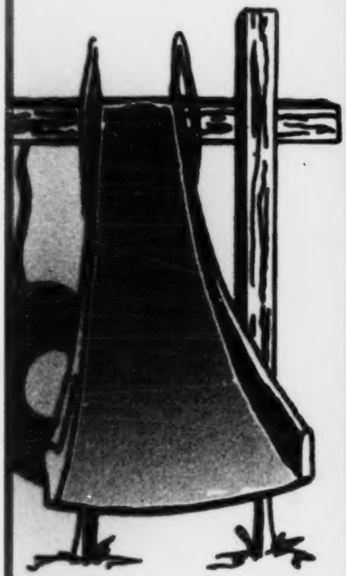
Contact: Region 7, Tom Hogan, 913-551-7684

Title: Asthma Outreach and Education in the Bronx

Description: The New York City Chapter of the American Lung Association (ALANY) is under a grant to provide asthma outreach and education at eight of the nine hospitals in the Bronx, NY. This program includes the education of asthmatic children and their caretakers in this high-asthma area. ALANY has given several training sessions to child care providers, such as Head Start workers, and has distributed limited asthma management equipment within a public school.

Partners: New York City Chapter of the American Lung Association

Contact: Region 2, Rachel Chaput, 212-637-4001

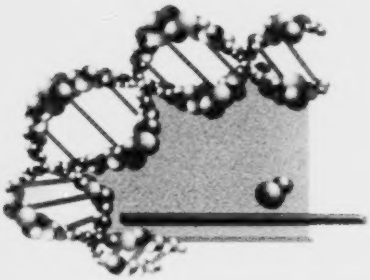


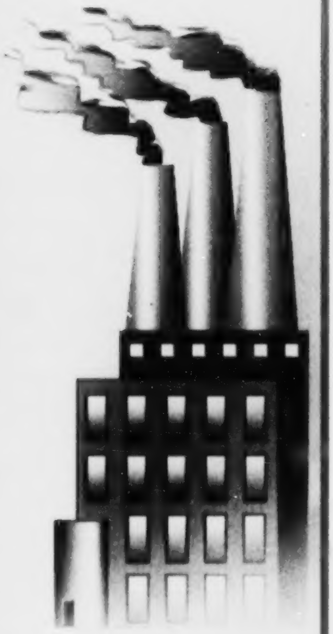
Title: Cockroach Movement and Allergen Distribution in Inner-City Apartments

Description: This research will provide information on where cockroaches are most often found in apartment buildings, what factors are related to their movement patterns, and how cockroach-related allergens (strongly associated with provoking asthma) are distributed throughout buildings based on movement of the insects. Patterns of cockroach movement have been investigated in some settings, but not in inner-city apartment buildings, where asthma prevalence in children is high.

Partners: Columbia University

Contact: Region 2, Rachel Chaput, 212-637-4001





Title: Asthma Conference in New York City

Description: EPA Region 2 is co-funding an asthma conference at the New York Academy of Medicine in New York City on May 4-5, 1998, with the Centers for Disease Control and Prevention. The conference will address asthma issues in the inner-city and explore ways to improve communications among the communities needing assistance and the scientific and health-care communities.

Partners: Centers for Disease Control and Prevention, Center for Urban Epidemiological Studies at the New York Academy of Medicine

Contact: Region 2, Rachel Chaput, 212-637-4001

Title: Puerto Rico Department of Health Asthma Projects

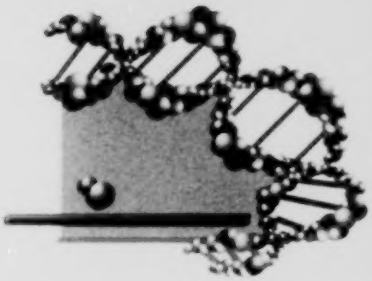
Description: Asthma is a serious issue in Puerto Rico, based on a series of epidemiological studies. Region 2 is supporting an Asthma Coordinator at the Puerto Rico Department of Health and will fund an environmental allergen study in Cataño, Puerto Rico, in cooperation with the University of Ponce Medical School. Measurements of the standard environmental allergens (dust mite, cockroach, cat) will be made in the homes of asthmatic children along with measurements of heavy metals and other substances of interest, such as bacterial endotoxin thought to be a lung irritant. The measurements will be conducted in 150 houses and will be complemented by an indoor air quality survey in the homes, and allergenic skin testing for the asthmatic children. This project will provide information on the levels of known allergens and irritants in homes in Cataño and will possibly show associations with the asthmatic children's asthmatic profiles.

Partners: Puerto Rico Department of Health, University of Ponce Medical School

Contact: Region 2, Rachel Chaput, 212-637-4001

Title: Environmental Interventions for Asthma

Description: Many indoor environmental substances, particularly allergens, may prompt asthma attacks. The prevalence of asthma is particularly high in inner-city children. EPA and the Einstein College of Medicine will conduct



a study to examine ways to reduce dust mites, cockroaches, rodents, environmental tobacco smoke, molds, and pet dander in the inner city.

Partners: Einstein College of Medicine

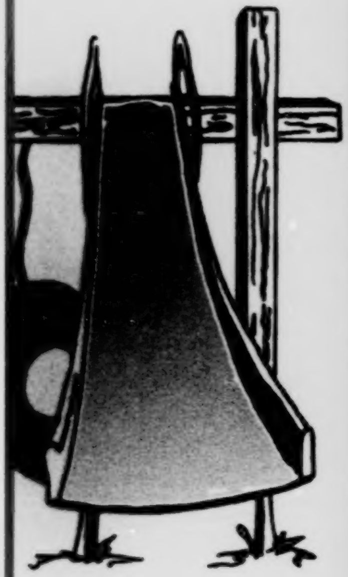
Contact: Region 2, Rachel Chaput, 212-637-4001

Research on Indoor Air Quality and Asthma and Other Respiratory Illness Among Children

Title: Asthma Assessment

Description: The National Academy of Science is collecting and analyzing available literature to determine the specific effects of indoor pollutants on asthma illnesses and death. The study will include both a general evaluation of asthma and indoor air quality and an analysis of the effects of individual indoor air pollutants on asthma, with special consideration for children. The project will determine the best methods to reduce exposures to indoor air pollutants that can cause or trigger asthma episodes. EPA will use the information to improve public outreach, including teaching children, parents, and school administrators about the benefits of reducing exposures to asthma triggers in homes and schools.

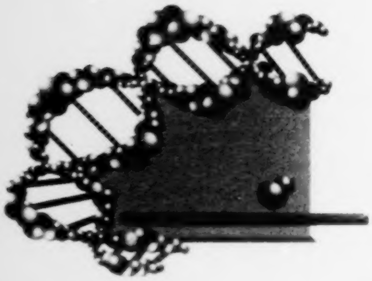
Contact: Office of Air and Radiation, Tracey Mitchell, 202-564-9446



Title: Allergens in the Development of Asthma in Children (Studied in Immature Rats)

Description: Allergic asthma most often develops in young children. Children may become more easily sensitized to common allergens because of differences in their immune response compared to adults. Researchers will use an established model of pulmonary allergy to house dust mites in rats to examine whether newborn rats become more readily sensitized to antigens (leading to an allergic response) compared to juvenile and adult animals. Further studies will investigate whether pre-exposure to viruses, air pollutants, and pesticides influence susceptibility to allergic lung disease.

Contact: Office of Research and Development, Hillel Koren, 919-966-6200

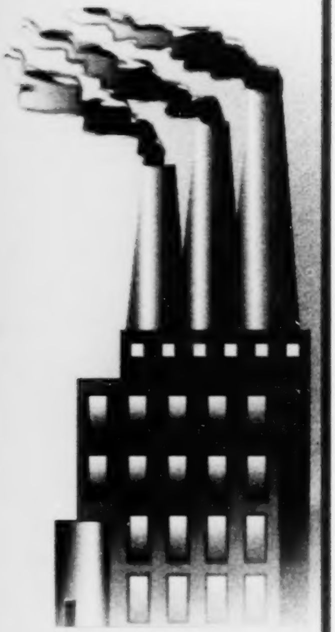


Title: Environmental Influences on Asthma in Children

Description: A population of wheezing children was recruited from a pediatric practice in Raleigh, NC. The clinical and allergic status of these children was documented and compared with children without asthma symptoms. Concentrations of various allergens were measured in the children's homes. Analysis of the data is underway.

Contact: Office of Research and Development, Hillel Koren, 919-966-6200

Outdoor Air Quality



Title: New National Ambient Air Quality Standards for Ozone and Fine Particles

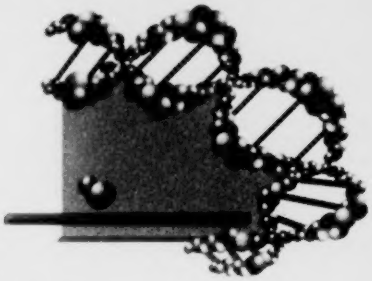
Description: EPA's new ozone standards respond to scientific evidence that the previous standards were not adequate to protect the health of certain sensitive populations (such as asthmatics) and healthy individuals (including children) from the effects of ozone and fine particulates. Selected research reviewed for the proposed standard included studies of children in summer camps. The fine particles standard responds to evidence that particles 2.5 microns or less in size are a significant health threat to adults and children, with studies showing more frequent and serious attacks of asthma in children.

Contact: Office of Air and Radiation, Sally Shaver, 919-541-5551

Title: Ozone Outreach Project

Description: EPA Region 1 undertook a comprehensive ground-level ozone outreach project, advising stakeholders and the public on air quality in the region. Activities stress the increased susceptibility of children to certain pollutants, particularly ground-level ozone. Outreach includes daily postings on the Internet of a color map detailing the predicted air quality rating for the following day for Region 1 areas (http://www.epa.gov.region01/eco/ozone), fact sheets and brochures on ozone and health effects, a conference on Clean Air and Public Health in July, television and radio messages, and press releases on days with unhealthy air.

Contact: Region 1, David Conroy, 617-565-3255



Title: Enforcement Program for Hazardous Air Pollutant Emissions

Description: Facility inspection, compliance, and enforcement efforts are targeted at sources emitting hazardous air pollutants, particularly in populated areas. These facilities may contribute to increased incidences of childhood cancer. EPA is developing air toxics standards on which the associated regulations can be enforced, and that will provide for adequate monitoring, record keeping, and reporting requirements.

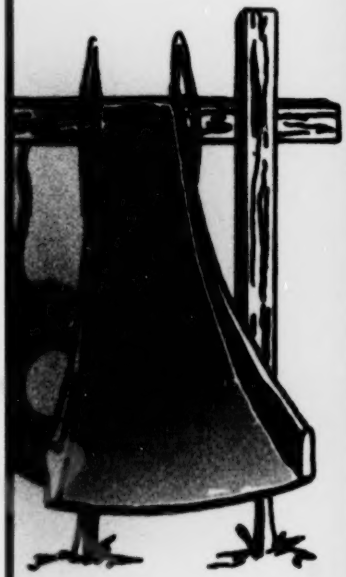
Contact: Office of Enforcement and Compliance Assurance, Charlie Garlow, 202-564-1088

Title: Asthma Outreach Initiative

Description: EPA Region 5 developed an Asthma Initiative to alert people with asthma, parents of children with asthma, and the elderly to the health hazards of ground-level ozone and its importance as an asthma trigger. The initiative also seeks to reduce asthma attacks during the ozone season. EPA published and distributed 150,000 brochures (Ozone Action Days: A Special Alert for People with Asthma and Other Respiratory Problems) to schools, doctors, hospitals, libraries, and pharmacies. Approximately 400,000 copies will be distributed in expanded areas. The Region also developed a Spanish-language brochure to be distributed in Hispanic communities and is developing an Arabic version.

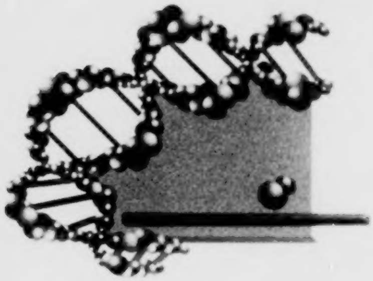
Partners: Local schools and public health community

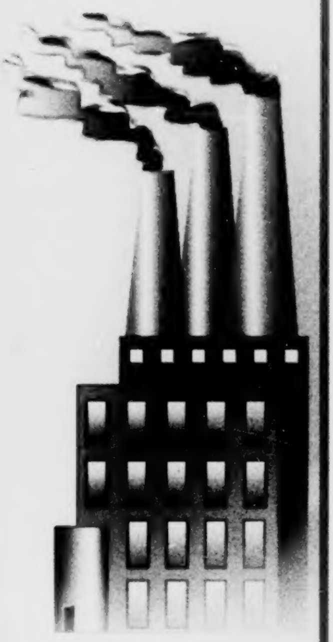
Contact: Region 5, Cheryl Newton, 312-353-6730



Title: Air Sampling Project, Winton Hills, Ohio

Description: Using a network of air monitors, EPA is conducting an air toxics study to identify and quantify ambient air contaminants in the Winton Place and Winton Hills communities of Cincinnati, Ohio. This study, which was developed with the assistance of community and industry representatives, will expand on the air toxics monitoring network currently maintained by the Hamilton County Department of Environmental Services. All of the monitoring sites will be in the Winton communities, which are close to heavy industry. Three sites involve Cincinnati public schools. Data





collected from the study will provide detailed air quality information for these communities and will be used to investigate reductions in community exposure, including enforcement if appropriate.

Partners: Hamilton County, Ohio

Contact: Region 5, Brian Barwick, 312-353-6730

RESEARCH ON OUTDOOR AIR QUALITY AND ASTHMA AND OTHER RESPIRATORY ILLNESS AMONG CHILDREN

Title: Total and Regional (Area) Deposition of Inhaled Particles in Children

Description: EPA is determining whether children (ages 6-18) can accumulate more fine particles (soot) in their lungs than adults. The study also will determine the extent to which age-related differences in lung size, function, and breathing patterns can influence the amount of soot that accumulates in the lungs of children and adults. Additional studies will include the accumulation of coarse particles in children (ages 5-18) as compared to adults.

Contact: Office of Research and Development, Hillel Koren, 919-966-6200

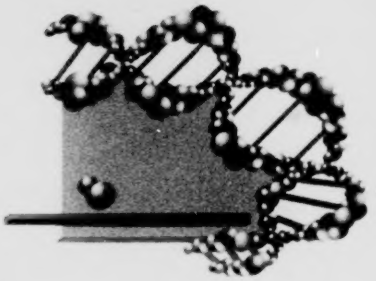
Title: Contributions of Oral versus Nasal Breathing to Fine Particle Deposition in Children

Description: Studies will determine whether breathing through the mouth versus through the nose influences the amount of fine particles (soot) that accumulates in the lungs of children and adults. In conjunction with these measurements, an assessment of the relative contributions of mouth versus nasal breathing at rest and during exercise in children will be made for comparison with adults.

Contact: Office of Research and Development, Hillel Koren, 919-966-6200

Title: Deposition of Air Pollutants in the Developing Human Lung

Description: EPA is developing a mathematical model to predict the amount of fine particulate matter (soot) that will accumulate in the developing human



lung. The model will account for humidity, temperature, age, and breathing rate as well as the relative distributions of particles in various lung areas.

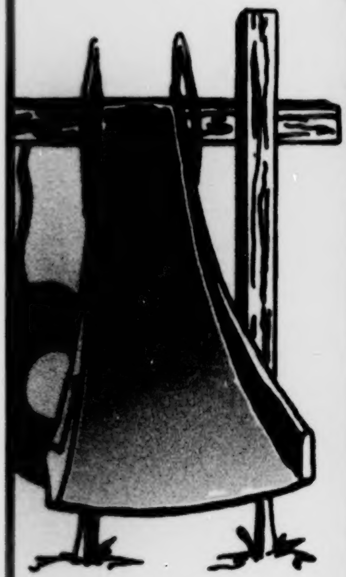
Contact: Office of Research and Development, Ted Martonen, 919-541-7875

Title: Childhood Susceptibility to Air Pollutants: Harvard-Mexico Studies

Description: EPA is studying the effects of short-term exposures to particulate matter and ozone on disease and death in residents of Mexico City. Measurements include daily assessments of preschool and school-age children for symptoms of acute respiratory illness, and peak flow (a measure of lung capacity) in school age children. Records of emergency room use in acute care hospitals and daily death records are being collected. Acute respiratory illness, peak flow, emergency room visits, and death are being examined for any relationship with daily particulate matter or ozone exposure.

Partners: Brigham Young University and Women's Hospital

Contact: Office of Research and Development, Bill McDonnell, 919-966-6220



Title: Lung Growth Study

Description: EPA researchers are determining the effects of long-term exposure to ozone, fine particulate matter, and other pollutants on lung growth and the development of chronic respiratory illness in children in 12 southern California communities. Baseline lung function and symptom data will be compared with air monitoring information.

Partners: University of Southern California

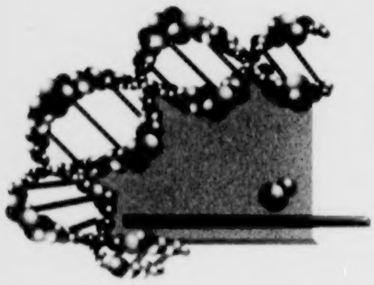
Contact: Office of Research and Development, Bill McDonnell, 919-966-6220

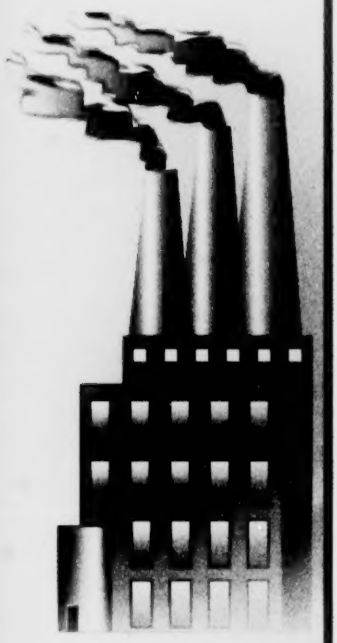
Title: Acute Respiratory Illness Study

Description: The relationship between acute respiratory illness in school-age children and short-term exposure to particulate matter and ozone is being studied as part of the Lung Growth Study. School absences due to illness will be followed up with a telephone interview with parents, and the relationship between illnesses and short-term particulate matter and ozone exposure will be examined.

Partners: University of Southern California

Contact: Office of Research and Development, Bill McDonnell, 919-966-6220





Title: Air Toxics and Pregnancy Outcome

Description: This study will compare data from the Aerometric Information Retrieval System (AIRS) database (which contains indices of ambient air pollution) and vital statistics data, such as low birth weight, neonatal death, and fetal death. EPA is currently examining data from the cities of Chicago, Denver, and Los Angeles.

Contact: Office of Research and Development, Bill McDonnell, 919-966-6220

Title: Childhood Susceptibility to Air Pollutants

Description: A collaborative study is underway to determine whether children are more susceptible than adults to nasal metaplasia (cancerous changes in cells), and whether biochemical tests can detect the morphological (form and structure) alterations caused by high ambient ozone and fine particulate matter in Mexico City.

Contact: Office of Research and Development, Gary Hatch, 919-541-2658

Title: Association between Ambient Ozone Concentration and Respiratory Symptoms and Effects in German and Austrian School Children

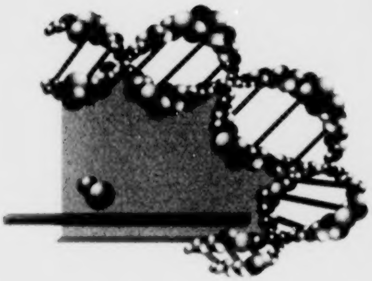
Description: This series of studies is designed to identify associations between levels of ambient ozone and upper respiratory effects. Ambient concentrations of ozone are monitored continuously from May to October. When a high or low ozone episode is detected, nasal samples and respiratory symptoms are measured in school children (ages 6 to 8). Preliminary results suggest a correlation between inflammation in the nasal cells and ambient levels of ozone.

Contact: Office of Research and Development, Robert Devlin, 919-966-6255

Title: Delivered Dose to Lungs in Infant versus Adult Rats

Description: This study deals with a comparison of the amount of ozone delivered to the lungs of infant versus adult rats as measured by radiolabeled isotopes of oxygen.

Contact: Office of Research and Development, Gary Hatch, 919-541-2658



Title: Effects of Oxidants on Pulmonary Damage in the Very Young

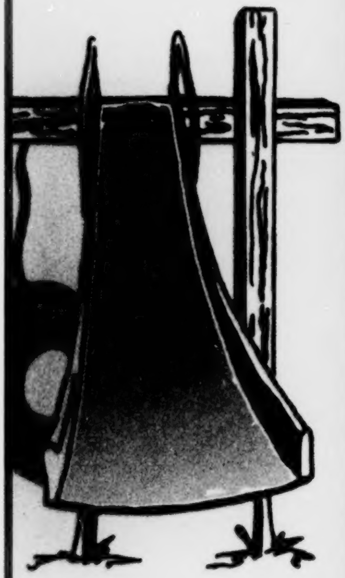
Description: This project will confirm preliminary evidence that young rats are more sensitive to inhaled oxidant pollutants, such as ozone, than adult rats, as shown by increased lung injury and inflammation. The study also will examine the mechanisms underlying the increased sensitivity of young animals to ozone and other pollutants.

Contact: Office of Research and Development, Robert Devlin, 919-966-6255

Title: Characterization of Emissions from Home Wood Combustion

Description: An objective of this study is to relate the possible health effects of wood combustion to sensitive subpopulations, such as children. This project will be completed through the use of field studies and laboratory measurements.

Contact: Office of Research and Development, Robert McCrillis, 919-541-2733



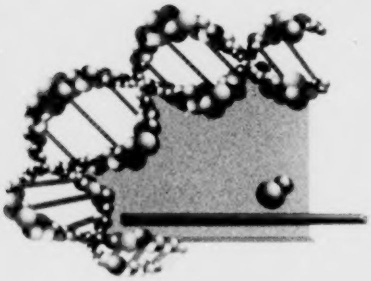
Title: Link between Death Rates in Infants and Exposure to Particulate Air Pollution

Description: EPA recently conducted a review to determine whether death in infants is linked with exposure to particulate matter (soot). Death records from the National Center for Health Statistics were combined with particulate matter levels from EPA's AIRS database. Among normal birth weight infants, high particulate matter exposure was associated with an increased incidence of death due to respiratory problems and Sudden Infant Death Syndrome (SIDS).

Contact: Office of Policy, Tracey Woodruff, 202-260-6669

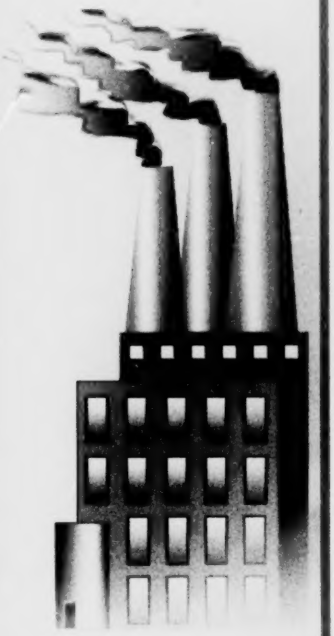
Title: An X-Linked Genetic Susceptibility for SIDS and Respiratory Failures in Infancy

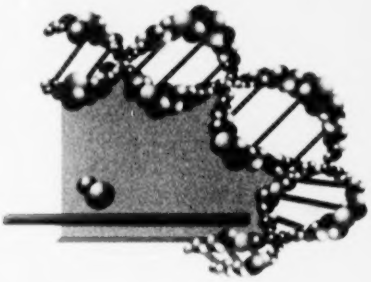
Description: A World Health Organization/EPA epidemiological study has shown that there may be a genetic cause for SIDS and other respiratory failures in infancy. The presence of a dominant allele occurring with a frequency of one-third on the chromosome explains the 61.2 percent male and 38.8 percent female sex distribution in these diseases and points to a defect in



anaerobic oxidation in the respiratory control centers of the brain stem as the proximal cause of SIDS and infant respiratory death.

Contact: Office of Research and Development, David Mage, 919-541-1327





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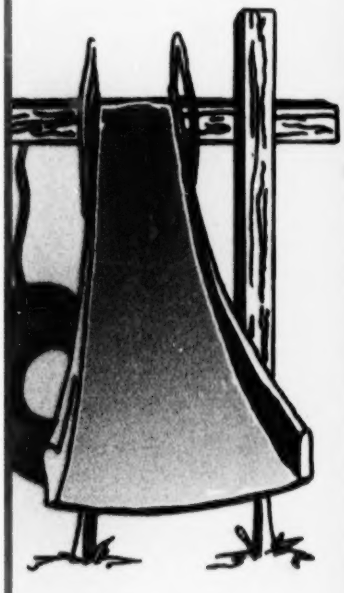

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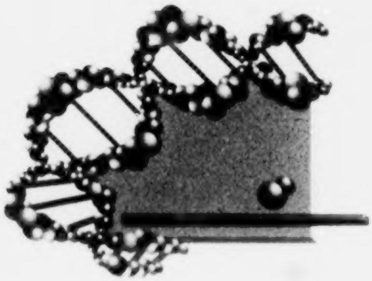

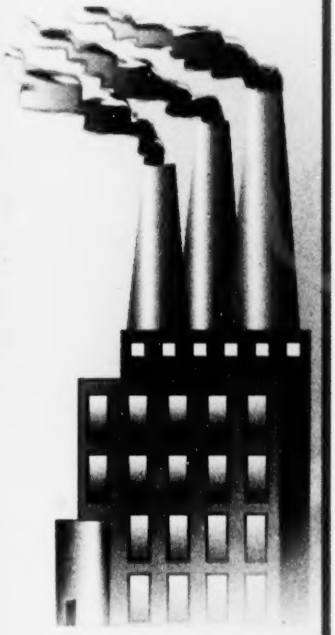

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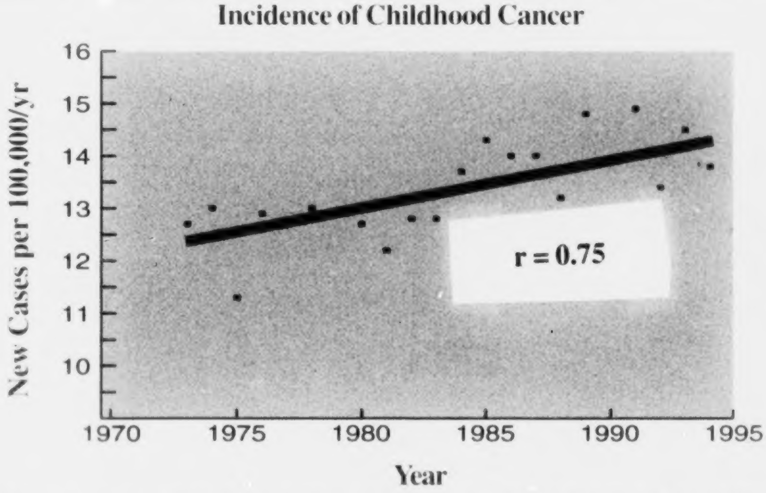
Chapter 3

Childhood Cancer

Definition

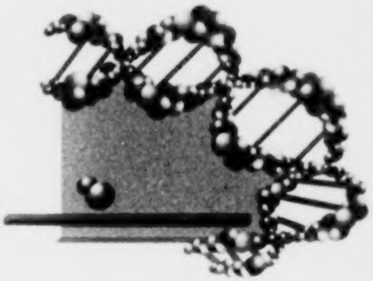
Approximately 8,000 children under the age of 15 are diagnosed with cancer each year in the United States.(1) In 1992, cancer was the fourth leading cause of death for American children under age 15, exceeded only by deaths from accidents, congenital anomalies (birth defects), and diseases of infancy.(2,3) The most prevalent forms of the disease in children are leukemia and brain cancer.(4)

The death rate from childhood cancer in the United States has declined dramatically in recent years due to improved treatment.(5) However, the overall incidence rate of new cancers in children has increased as shown in the table below.(6,7) The trends in some cancer types suggest the need for a closer examination of the underlying factors leading to disease in children. This includes determining whether environmental contaminants play a role in causing the disease.



Incidence of cancer in children by calendar year of diagnosis, 1973-1994, United States, SEER (data from Table 27-3). The correlation coefficient, r, is 0.75

Cancer is characterized by the uncontrolled growth of cells. When a cell becomes cancerous, it loses its ability to regulate its own growth, control cell division, and interpret messages from other cells. Each tumor is believed to originate from a single cell gone awry. The transformation of a normal cell into a cancerous one requires a series of alterations often involving mutations in DNA, the genetic code. This stepwise series of



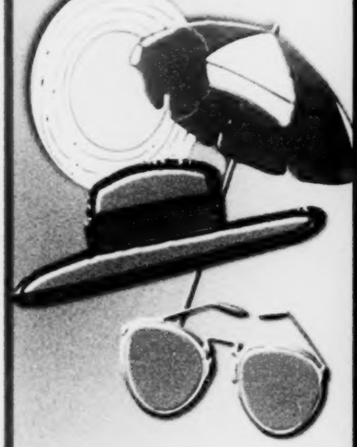
changes usually takes many years to complete, although in young children, the sequence may be accelerated. In addition to possibly causing childhood cancer, exposure to a carcinogen as a child may lead to cancer as an adult. Carcinogens are substances that trigger or accelerate the development of cancer. Cancer may be initiated or accelerated by radiation and by some toxic chemicals.

Possible Environmental Factors

Exposures to certain carcinogens in the environment may be associated with some human cancers.(8,9) People can be exposed to carcinogens through many routes, including air, water, food, drugs, surface contact, and tobacco use. Examples of environmental factors that may be associated with cancer are:(4,9,10)

- Environmental tobacco smoke (or secondhand smoke)
- Radon
- Asbestos
- Ultraviolet light
- Some hazardous waste
- Some pesticides

Indoor air toxics are addressed more fully in Chapter 2 and pesticides in Chapter 5 of this report.

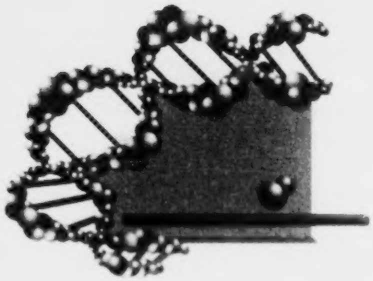


Environmental Tobacco Smoke (Secondhand Smoke)

Infants and children who live in households with smokers involuntarily inhale the toxic substances in tobacco smoke. Environmental tobacco smoke (ETS) is a complex mixture of more than 4,000 chemicals, such as nicotine, tars, formaldehyde, and hydrogen cyanide.(11) Some of these contaminants are known human carcinogens.(12) More information on children's risks resulting from toxic substances in ETS is presented in Chapter 2 *Asthma and Other Respiratory Effects.*

Radon

Radon, a known human carcinogen, is a naturally occurring, radioactive gas that is colorless, odorless, and tasteless. It comes from the natural decay of uranium, a radioactive metal found in soil and rock in the earth's crust all over the United States. Radon travels through soil and enters the indoor environments of buildings through cracks and other openings in the foundation. Eventually, radon decays into radioactive particles that can be



inhaled and then trapped in the lungs. As these particles decay, they release small bursts of radiation that can damage lung tissue and lead to lung cancer later in life.(13)

EPA estimates that radon may cause from 7,000 to 30,000 lung cancer deaths in the United States each year. Radon is the second leading cause of lung cancer deaths in adults, after smoking. An individual's risk of getting lung cancer from radon depends mainly on three factors: the level of radon, duration of exposure, and smoking habits. Risk increases in individuals exposed to high levels of radon over a long time. The risk of dying from lung cancer caused by radon is much greater for smokers than for non-smokers.

Asbestos

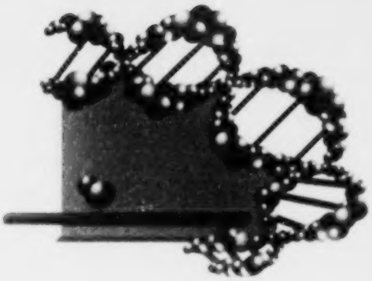
Asbestos is a fibrous mineral that was used widely in construction materials, such as shingles for roofing and siding, pipe and boiler insulation, floor tiles, ceiling panels, coatings, and gaskets. It is present in schools and other public buildings as well as in some residential structures. Asbestos has caused lung cancer and malignant mesothelioma in the children of asbestos workers. The children were exposed to asbestos-contaminated dust brought home from work on their parents' shoes and clothing. EPA estimates that at least 1,000 premature deaths from cancer will occur in this country over the next 30 years among children who are exposed today to asbestos in schools.(14) Asbestos is harmful only when inhaled. If an asbestos-containing product, such as a floor covering, is not disturbed enough to release microscopic particles into the air, no disease is expected to result.

Ultraviolet Light

Overexposure to the sun's harmful ultraviolet (UV) light may damage children's skin. Ultraviolet light is radiation from the sun that has a wavelength shorter than visible light (toward the violet end of the visible spectrum) but longer than that of X-rays. This type of radiation has increased on the earth's surface due to damage to the earth's ozone layer in the outer atmosphere. Excessive sunburns experienced by children 10-15 years of age increase by three fold the chance of developing malignant melanoma, the most deadly kind of skin cancer, later in life.(15,16)

Hazardous Waste

Exposure to hazardous wastes that have been released into the environment may present serious health hazards to children. Hazardous wastes include substances that have cancer or non-cancer health effects, are corrosive, or may present a danger due to fire or explosion. They include a wide range of organic chemicals and heavy metals, as well as strong acids and bases. Children may be exposed to such wastes when they play or live near uncontrolled hazardous waste sites or spills. EPA estimates that 12 million people,



including 4 million children, live within one mile of the nation's hazardous waste sites. Many more children suffer from the toxic effects of heavy metals, such as lead, or are poisoned accidentally from improper pesticide use in their homes.(17,18)

Summary of EPA Activities

Environmental Tobacco Smoke

EPA's activities relating to ETS are described in Chapter 2 *Asthma and Other Respiratory Effects*.

Radon

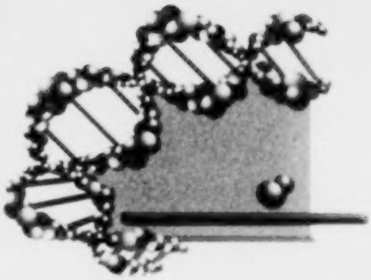
EPA oversees a program to detect and reduce elevated radon levels in buildings and to inform the public about radon. Through partnerships with schools, non-profit organizations, and state agencies, EPA promotes: (1) radon awareness and testing programs for schools and homes; (2) radon-resistant building practices; (3) methods to lower radon levels; (4) training for school maintenance personnel on methods to lower radon levels; and (5) technical assistance in inspecting school buildings. An important component of this program is the National Radon Hotline (see Chapter 11).

EPA has participated in research to identify areas of the country with high levels of radon in homes, schools, and workplaces, and to determine the national distribution of radon levels and associated risks. EPA has supported the development of new technologies to reduce radon concentrations in existing and new buildings.

Asbestos

EPA provides education and technical assistance to school districts that inspect school buildings for asbestos-containing material and control asbestos contamination. This assistance is required by EPA's Asbestos-in-Schools Rule (1987). EPA has a mandatory training and accreditation program for professionals who work in schools and public and commercial buildings to control asbestos. EPA has approved 27 states to administer the Asbestos Model Accreditation Plan (MAP) Rule and directly administers a federal program in the remaining states. This program protects children and the general public by helping ensure that buildings are inspected or cleaned up only by properly trained and accredited personnel.

EPA conducts some inspections to ensure compliance with the federal requirements for managing asbestos indoors. EPA also ensures proper accreditation of workers. The Agency takes enforcement actions to bring violators into compliance. EPA also provides grants to several states and Native American Tribes for compliance monitoring activities.



Ultraviolet Light

EPA offers educational programs for parents, students, and teachers about the health risks resulting from exposure to UV light, and encourages them to reduce exposure. A new EPA program calls for participating schools to monitor the daily UV Index (a measure of exposure based on weather), undertake one or more activities to reduce sun exposure, and report their progress to EPA. EPA also has developed a World Wide Web site that encourages teachers and students to learn about ozone depletion, UV radiation hazards, and steps to reduce UV exposure.

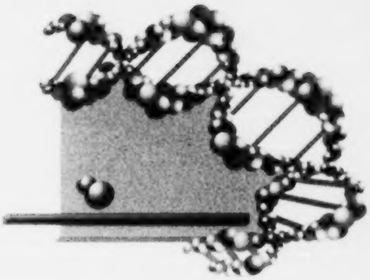
Hazardous Waste

EPA is conducting research to determine the specific effects of hazardous substances on children. For instance, a current EPA research project includes an approach for predicting the cancer risk from vinyl chloride gas that takes into account a child's increased sensitivity to this gas. This "state of the science approach" provides a better tool for determining health risks to children. EPA also is conducting a study of potential exposures of children to over 300 chemical compounds in a locality with an increased rate of childhood cancers over the past 21 years. A related study addresses the health effects of arsenic as a function of age. EPA enforcement efforts to remove or reduce children's exposure to hazardous waste are included in Chapters 4 *Developmental and Neurological Toxicity* and 5 *Health Effects of Pesticides*.

EPA Projects Related to Cancer

Radon

Title:	Radon Mitigation for School Maintenance Personnel
Description:	EPA Region 4 sponsored radon courses designed specifically to train school maintenance personnel on how to fix their own schools. This approach, which has served 15,000 clients in three states, is much more cost effective than if the schools had to contract for the work. Discussions are underway with Kentucky and North Carolina to offer the same opportunity.
Partners:	Alabama, Tennessee, and South Carolina Radon Programs, and Southern Regional Radon Training Center
Contact:	Region 4, Patricia Brooks, 404-562-9145



Title: School Visits in Counties with the Highest Radon Risk

Description: Region 4 has funded a project in which 25 schools in areas expected to be at risk for high radon levels will be visited. The *Indoor Air Quality Tools for Schools* guidance, which has a radon component, will be introduced and explained, and a courtesy walk-through inspection of each school will be conducted. It is anticipated that this program will serve 10,000 clients.

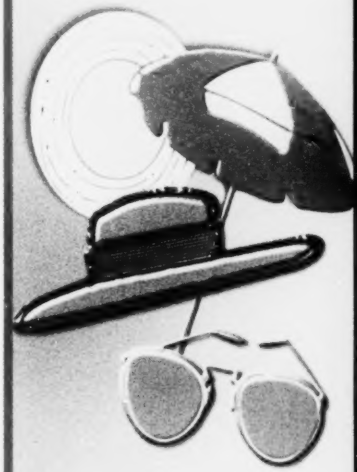
Partners: The Southern Regional Radon Training Center

Contact: Region 4, Patricia Brooks, 404-562-9145

Title: Radon Outreach

Description: The Indoor Air program of Region 7 includes state and tribal radon programs and a variety of other indoor air quality topics such as ventilation, carpet, carbon monoxide, formaldehyde, and microbes. These programs focus on education, outreach, and technical assistance. The programs emphasize partnerships with schools, not-for-profit organizations, and state and local governments to promote radon awareness, voluntary testing of homes and schools for radon, radon-resistant building codes and construction, and radon cleanup.

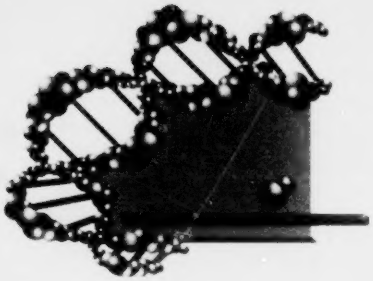
Contact: Region 7, Tom Hogan, 913-551-7684



Asbestos

Title: Asbestos-in-Schools Rule

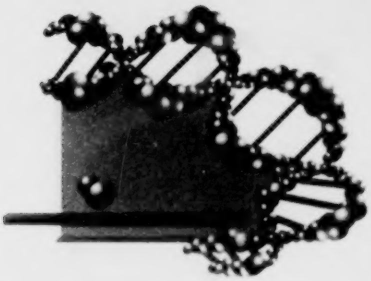
Description: In response to the Asbestos Hazard Emergency Response Act, EPA published the Asbestos-in-Schools Rule (1982, updated in 1987). The rule requires public and private elementary and secondary schools to inspect for friable (easily crumbled) and non-friable asbestos, develop management plans to address hazards, and conduct responses to eliminate the asbestos. The EPA rule also specifies training, examination, and other requirements to accredit persons who do this work, and sets requirements for warning signs and transportation and disposal of materials containing asbestos. EPA continues to monitor the requirements of the Asbestos-in-Schools Rule and to enforce standards that protect children against



asbestos hazards. The rule includes requirements for preschools and daycare centers to protect younger children. EPA provides Toxic Substances Control Act funds to 26 states to carry out asbestos and other inspections. States refer violations to the appropriate EPA regional office for enforcement. Contact Jack Neylan, 202-564-5033 or Karen Taimi, 202-564-5046. Examples of activities to promote the Asbestos-in-Schools Rule include:

Region 5:	The Region currently provides grants to three states for the purpose of inspecting schools to ensure adherence with the Rule. Contact Phyllis Reed, 312-886-6018.
Region 6:	Local education agencies are required to inspect for the presence of asbestos in schools. If asbestos is present, it must be managed in good condition or removed. Contact Neil Pflum, 214-655-2295.
Region 7:	The Region has inspected about half of the approximately 4,000 school districts in the Region. Schools have removed or immobilized large quantities of asbestos-containing materials in their buildings to protect the safety of children, teachers, staff, and other occupants. Contact Tom Hogan, 913-551-7684.
Region 9:	Region 9 conducts inspections and provides technical assistance to the regulated community to ensure requirements are met in schools and daycare centers. The Region also funds grants to states and tribes to develop their own asbestos programs. Contact Paula Bisson, 415-744-1128.

Title:	Example of Asbestos Enforcement Case
Description:	A company responsible for the removal of asbestos from a Philadelphia facility abandoned 500 bags of asbestos materials in an unsecured facility. Children played with the materials and exposed themselves to hazards. The owner of the company was sentenced to six months incarceration and three years of probation, and was required to seek mental health counseling.
Partners:	EPA and the Philadelphia Environmental Crimes Task Force
Contact:	Office of Enforcement and Compliance Assurance, Martin Topper, 202-564-2564



Ultraviolet Light

Title: Ozone Depletion Art Project

Description: The Ozone Depletion Art Project uses the Internet to motivate students to learn about ozone depletion, UV radiation hazards, and ways to reduce sun exposure. Using an EPA web site (www.epa.gov/ozone/art), teachers and their students learn more about ozone depletion and UV exposure precautions. They submit drawings on the ozone layer (how it protects us from UV radiation); ozone depletion (how ozone-depleting substances harm the ozone layer); how UV radiation is measured; and how we can protect ourselves from the sun's UV rays. EPA has received more than 200 drawings so far. EPA also responds to approximately 50 questions and comments per month from students and teachers.

Contact: Office of Air and Radiation, Jeffrey Levy, 202-564-9727

Title: Sunwise School Program

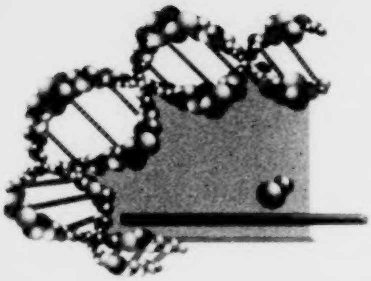
Description: The Sunwise School Program is a school-based partnership that directly addresses health risks resulting from exposure to UV radiation. Member schools make a commitment to: report the UV Index daily, undertake activities to reduce sun exposure, and document their activities and report their progress to EPA. The program encourages schools to work with local meteorologists, physicians, and community groups in planning their individual Sunwise School Programs. EPA provides schools with guidance on setting their Sunwise School Program goals, and recognizes participating schools.

Contact: Office of Air and Radiation, Kevin Rosseel, 202-564-9731

Hazardous Waste

Title: Vinyl Chloride Risk Assessment Approach for Children

Description: EPA Region 9 and the Office of Research and Development developed a risk assessment method that offers an innovative approach for protecting



children from exposure to the carcinogenic gas, vinyl chloride. This risk assessment method has been published in the scientific literature, presented at national and international scientific meetings, nominated for an EPA scientific achievement award, and is being incorporated into the revised vinyl chloride file in IRIS (EPA's Integrated Risk Information System). Newborn animal exposure studies have demonstrated that even a brief exposure in newborns to vinyl chloride could cause more cancers than if exposures had occurred later in life. The risk assessment method has been used in Region 9 to set indoor air action levels protective of children exposed in their homes to landfill gas containing vinyl chloride.

Contact: Region 9, Gerald Hiatt, 415-744-2319 or Arnold Den, 415-744-1018

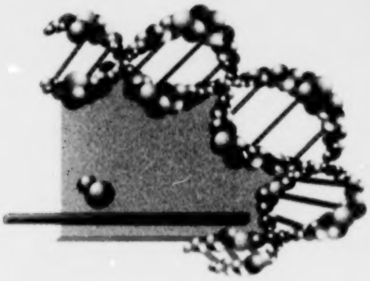
Title: Site Assessment in Response to Cancer in Children

Description: McFarland is a small, mostly Hispanic, agricultural community in California's Central Valley. For the past 21 years, it has had an increased rate of childhood cancers documented by the California Department of Health Services. Due to the concern about children's health, EPA is sampling and analyzing the air, soil, and water for releases of hazardous substances associated with past industrial and agricultural practices, and is investigating health problems relating to children. Sampling is expected to be completed next year, and should allow EPA to determine the best approach to eliminating any causes that are identified through the site assessment.

Contact: Region 9, Mark Calhoon, 415-744-2376 or Elizabeth Adams, 415-744-2261

Title: Multi-Pathway PAH Exposure Field Evaluation for Children in Low-Income Families

Description: The purpose of this research is to understand the extent to which children in low-income families are being exposed to polycyclic aromatic hydrocarbons (PAHs). PAHs are a product of incomplete combustion of carbon substances (e.g., from automobile exhaust, smoke stacks, and cooking) and are fairly pervasive in the environment. A pilot study that included both inner-city and rural homes examined the exposures of children to PAHs in air, water, food, house dust, and soil. EPA is extend-



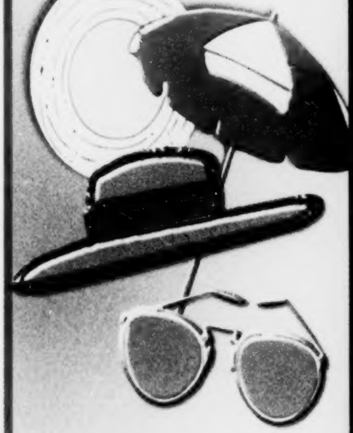
ing this research to include low-income children in daycare centers. Preliminary results indicate that exposure to PAHs through inhalation, skin contact, and dirt and dust ingestion is as important a source of contamination as is dietary exposure for young children. Future research will compare low-income and middle-income family exposures.

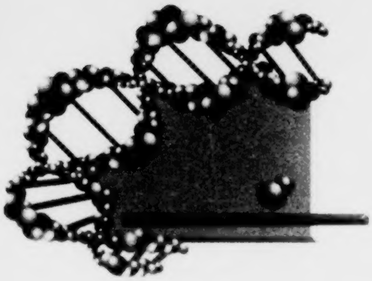
Contact: Office of Research and Development, N. Colleen Wilson, 913-551-7272

Title: Evaluation of Urinary Metabolites of Arsenic for Exposure Biomarker

Description: Information on urinary arsenic metabolic profiles (chemical indicators of the presence of arsenic in the body through urine tests) are being developed for arsenic in drinking water and diet. This will enable EPA to compare differences as a function of age (adults and children under 16), sex, volume of water ingested, and individual differences.

Contact: Office of Research and Development, Rebecca Calderon, 919-966-0617





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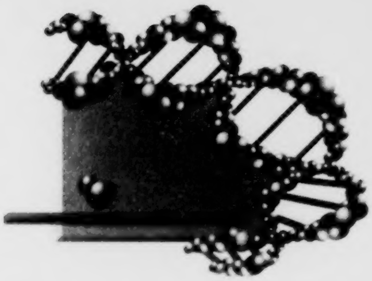

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Chapter 4

Developmental and Neurological Toxicity

Definition

Neurotoxic substances are chemical compounds that, depending on the dose, may have harmful effects on brain function and interfere with the workings of the nervous system. Neurotoxics may affect intelligence, language ability, and attention.(1,2,3,4) They may cause behavioral problems and affect mood and social adjustment. At very high doses, neurotoxics may produce such effects as coma, convulsions, respiratory paralysis, and death.(5) Lead, mercury, and polychlorinated biphenyls (PCBs) are among the substances suspected of having harmful and possibly permanent neurological effects on children.

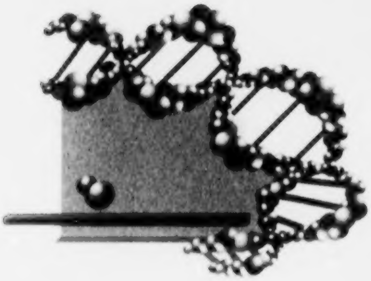
The Mad Hatter

Lewis Carroll's Mad Hatter character in *Alice's Adventures in Wonderland* probably is based on observations of the neurotoxic effects of inhaling vapors from mercury that nineteenth century hat-makers used to prepare felt.

Abnormal development is a major concern in children because it may result in birth defects and lasting changes in intelligence, behavior, and reproductive capability. A child's nervous system, reproductive organs, and immune system grow and develop rapidly during the first months and years of life. As organ structures develop, vital connections between cells are established. These delicate developmental processes in children may be easily and irreversibly disrupted by environmental toxic substances, such as lead.(6)

Neurotoxics that may have only a temporary ill effect on an adult brain can cause enduring damage to a child's developing brain.(7,8) The immaturity of children's internal systems, especially in the first few months of life, affects their ability to neutralize and rid their bodies of certain toxics. If cells in the developing brain are destroyed by lead, mercury, or other neurotoxic chemicals, or if vital connections between nerve cells fail to form, the damage is likely to be permanent and irreversible. This may mean a loss of intelligence and alteration of normal behavior.(9,10,11,12)

Lead is a neurotoxic metal that affects areas of the brain associated with regulating behavior by altering the output of neurotransmitters and disrupting the development of nerve cells. Lead poisoning in children may cause lowered intelligence, reading and learning disabilities, impaired hearing, reduced attention span, hyperactivity, and antisocial behavior. Pregnant women exposed to lead may transfer the metal to a developing fetus,



resulting in developmental problems. While the fetus is developing, there are critical periods for each organ system, including the nervous system. During these critical periods, the cells of the body are especially sensitive to environmental toxics that may interfere with the normal development of organ structure and function.

A growing body of evidence suggests a number of synthetic and naturally occurring organic chemicals may disrupt the endocrine (hormonal) systems of humans and wildlife. A variety of chemicals cause endocrine disruption in laboratory animals, and some scientists have hypothesized that these effects also may occur in humans. Although further research is needed before such effects can be either demonstrated or ruled out, theoretically children would be at particular risk from very low levels of endocrine disrupting chemicals because of the important role the endocrine system plays in development. Concern exists about the potential for adverse developmental effects because chemicals that block or "mimic" reproductive and thyroid hormones may determine the course of prenatal development.(13,14)

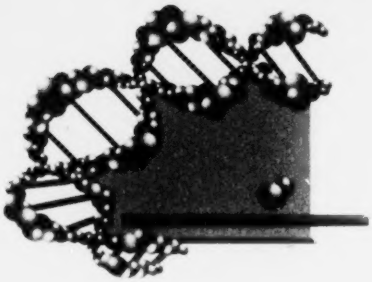
Possible Environmental Factors

Lead

Lead is a major environmental health hazard for young children. In 1997, the Centers for Disease Control and Prevention (CDC) reported that between 1991 and 1994, about 900,000 children in the United States under the age of six had elevated blood lead levels.(15,16)

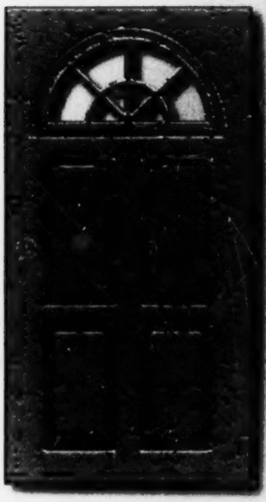
Childhood Lead Facts

- 900,000 American children have elevated blood lead levels of concern.(15)
- Lead paint in older housing is the principal source of lead exposure today.(15,16)
- Drinking water can be a significant source of lead exposure in some homes and buildings.(15,20)
- In the fetus and young children, elevated lead may damage the brain, resulting in persistent neurological dysfunction.(12)



Approximately 75 percent of U.S. homes built prior to 1978 contain some lead paint.(17,18,19) Children living in older homes are threatened by chipping or peeling lead paint, and by excessive amounts of lead-contaminated dust resulting from efforts to remove paint during remodeling. Children may be exposed to lead through drinking water that has elevated concentrations from lead plumbing materials and corrosive water. They may breathe air contaminated from nearby smelters, battery plants, and industrial facilities that process lead. Exposure to lead from nearby hazardous waste sites also is a concern.(15,20)

Endocrine Disruptors



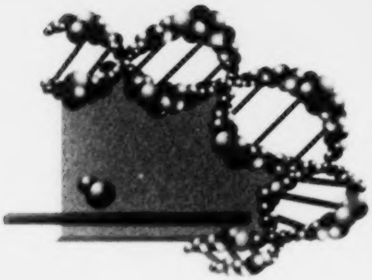
Increasing scientific and public attention has been focused on substances that have the potential of disrupting the endocrine systems of wildlife, laboratory animals, and possibly humans.(21) Disruption of the endocrine system may occur in various ways. Some chemicals may mimic a natural hormone, in effect fooling the body into over-responding to the hormone. Other chemicals may block the effects of a hormone in parts of the body normally sensitive to it. Still others may indirectly stimulate or inhibit the endocrine system, leading to overproduction or underproduction of hormones. Endocrine disruptors may also play a role in reproductive cancers.(22)

Scientific questions remain, however, about which chemicals are involved in disruption of the endocrine system and how children may be exposed to those chemicals. It is not yet known whether health effects similar to those observed in laboratory animals are produced in humans, and what methods are best for testing for these effects. EPA is investing significant resources to find answers to these questions.

PCBs and Dioxins

PCBs and dioxins produce a number of toxic effects in animals.(23,24) They have been linked to such health concerns as decreased gestational age, lower birth weight, depressed immune responses, impaired mental development, and growth retardation.(24,25,26) Dioxin is considered by EPA to be a known human carcinogen and as such may have adverse effects on children that do not become apparent until many years after exposure occurs.(24,27) However, no direct causal relationship has been established between PCB exposure and human health effects.

EPA banned PCBs over 20 years ago, and the Agency has taken steps to regulate over 95 percent of known sources of dioxin in the United States. Unfortunately, these chemicals are highly persistent in the environment. Because PCBs accumulate in fish and in humans, additional exposures to infants and young children may occur through ingesting contaminated fish and breast milk.(22)



MERCURY

Mercury is another neurotoxic substance that can produce a wide range of health effects depending on the amount and timing of exposure. Mercury is a liquid at room temperature but vaporizes readily; in vapor form it is readily absorbed through the lungs. Repeated exposures to low levels of mercury vapor over long periods have been associated with tremors, irritability, impulsiveness, drowsiness, impaired memory, and sleep disturbances.(28) These effects may occur at lower levels of exposure in children than adults.

When mercury attaches to an organic molecule, it may be absorbed into the body through the digestive tract. Methylmercury, which is produced naturally by certain bacteria, is such a molecule. It can cross the placenta and enter the brain, causing severe brain damage in fetuses. High mercury levels in fish consumed by pregnant women have been linked to severe brain damage and cerebral palsy in newborns.(28,29)

Children are exposed to mercury primarily from eating contaminated fish. However, children eating soil contaminated with mercury or accidental exposures to mercury, also have been documented.

MANGANESE

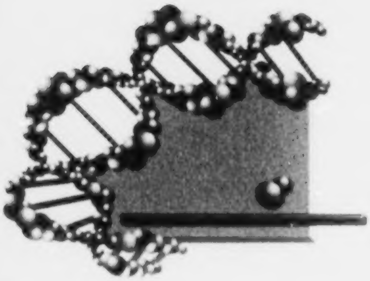
Airborne manganese particles emitted from industrial and natural sources or from a fuel additive (methylcyclopentadienyl manganese tricarbonyl or MMT) may be neurotoxic. Although MMT was banned by EPA as a gasoline additive in 1994, a recent court ruling allowed the additive to be used while being tested for health effects. Laboratory studies show that manganese disturbs normal functioning of brain cells in rats. Manganese compounds also cross the placenta and may retard growth in fetal rodents. Evidence of developmental effects from chronic inhalation of manganese compounds in humans comes from manganese miners, who have high rates of psychosis and frequently suffer from a condition similar to Parkinson's disease.(30,31)

SUMMARY OF EPA ACTIVITIES

LEAD

EPA's phase out of lead in gasoline, beginning in 1976, has resulted in a major reduction in airborne lead levels. Between 1976 and 1995, ambient air lead concentrations in the United States have declined on average by 97 percent.(32)

Several measures have substantially reduced lead exposure from drinking water. The Safe Drinking Water Act prohibits use or sale of lead solder and the manufacture of water coolers containing lead components. Plumbing manufacturers have phased down the



amount of lead in faucets and other fixtures. Water suppliers are required by EPA regulation to minimize the corrosiveness of their water and replace, where needed, lead service connections. Lead in the diet has been reduced dramatically because crops are much less likely to be contaminated by lead in the air and because of the phase out of lead solder in food cans. The combination of all of these actions has helped reduce average blood lead levels in children and adults by more than 80 percent since the 1970s, according to CDC data, protecting millions of children from serious, permanent neurological effects.(16)

Because of the continuing threat of exposure from lead paint, EPA works with the Departments of Housing and Urban Development (HUD) and Health and Human Services (HHS) to ensure that the nation's housing is safe from lead contamination. HUD and EPA are responsible for enforcement of the Residential Disclosure Rule that gives consumers the right to know about lead-based paint hazards in pre-1978 homes that they may buy or rent. This rule requires, among other things:

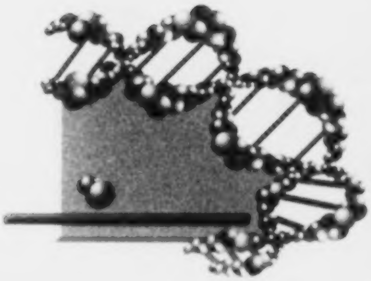
- Disclosure of all known lead-based paint hazards in pre-1978 housing and any available reports on lead in the housing.
- Distribution of the EPA pamphlet "Protect Your Family from Lead in Your Home."
- Inclusion of warnings in sales or lease contracts.
- An opportunity to test the housing for lead.

EPA also is working with the states to help ensure that abatement (control or removal) of lead-based paint hazards is carried out safely. The Agency has established rules regulating the training of individuals conducting lead-based paint abatement, accreditation of training programs, and certification of contractors.

A comprehensive assessment of residential lead risks to children is being developed by the Agency. This assessment will include a process for identifying specific levels of lead contamination in residential dust and soil as well as paint conditions that present hazards to children.

EPA is taking legal action at nonferrous metal smelters that violate state or federal regulations. Through increased enforcement, EPA is reducing lead emissions that may contaminate schools and lawns where children play. The Agency also is researching childhood blood lead levels in communities surrounding former lead smelters and paying close attention to ongoing studies in this area.

EPA, the Agency for Toxic Substances and Disease Registry (ATSDR), and HUD are working together to examine blood lead levels in children and to develop ways to deal with the effects of environmental lead on children in urban environments. This work



includes examining the dietary intake of lead in young children and investigating the effects of lead on adolescent development and maturation.

The Agency conducts a variety of public education programs aimed at the children most at risk from lead poisoning, particularly disadvantaged children who live in houses contaminated with lead paint. For example:

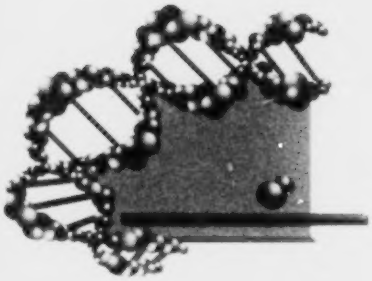
- A number of EPA regions are training volunteers to educate residents in low-income areas about how to recognize and prevent childhood lead poisoning in their communities.
- In Region 7, community outreach focuses on protecting children from lead poisoning in residential settings and in mining communities, where blood lead studies revealed unsafe lead levels in children.
- Other regions offer programs to protect tribal groups and migrant workers from lead contamination in soils.

Scientists Study New Methods for Assessing Lead Exposure among Children

EPA is expanding its efforts to evaluate the impact on children from lead-contaminated hazardous waste sites. A new Integrated Exposure and Uptake Biokinetics (IEUBK) model was designed to be used in predicting the risks to children posed by sites with lead contamination. This method allows researchers to evaluate the risk of lead poisoning to children between the ages of six months and six years for the first time. It predicts changes in blood lead levels based on exposure through soil ingestion and inhalation, allowing EPA to better evaluate the need for cleanup at the site.

Endocrine Disruptors

EPA has developed a substantial research program to understand the adverse effects of endocrine disrupting chemicals that exist in the environment. Under the mandates of the Safe Drinking Water Act and the Food Quality Protection Act, EPA established the *Endocrine Disruptor Screening and Testing Advisory Committee* to advise the Agency on a screening and testing strategy for potential endocrine disruptors. EPA has issued new guidelines for evaluating reproductive toxicity and is updating guidelines for reproductive and developmental toxicity testing. Region 5 sponsored a workshop to discuss science and public policy issues related to endocrine disruptors in the Great Lakes Basin.



EPA is devoting significant resources to implement a multi-year research strategy on endocrine disruptors. Agency personnel participate in a workgroup (convened by the President's Office of Science and Technology Policy) charged with coordinating research on endocrine disruptors throughout the federal government. The Agency is funding the National Research Council's detailed review of existing literature on endocrine disruption. EPA has prepared its own review of the literature and has issued an interim policy statement while it awaits the NRC report.(22) EPA also is sponsoring research on the reproductive effects of certain pesticides, the relationship between human sperm count and fertility, and reproductive problems among alligators and fish resulting from chemical contamination.

PCBs and Dioxins

EPA is conducting research to better understand the potential neurological and developmental effects of PCBs and dioxins. EPA is assessing the neurotoxic risks to children exposed to PCBs, and is further examining the long-term effects of PCB exposure.

Mercury

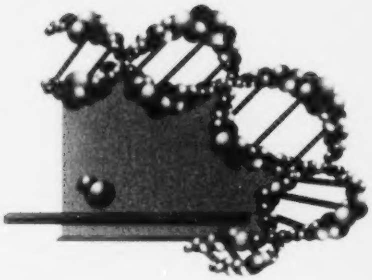
EPA has recently completed a Report to Congress on mercury that assesses the magnitude of U.S. mercury emissions, the health and environmental implications, and control technologies. (33)

EPA is conducting studies that focus on specific risks to children from mercury, and is monitoring the findings of human studies on methylmercury exposure and its impact on nervous system development. The Agency will continue its work on setting standards for allowable levels of exposure to mercury. EPA also has begun a public education program to increase awareness and prevent mercury poisoning in children exposed to mercury vapors in homes.

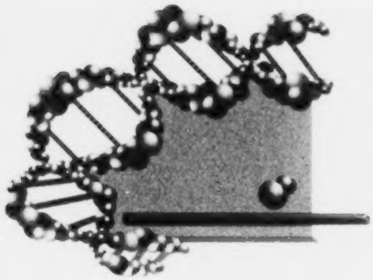
EPA Projects on Developmental and Neurological Toxicity

Lead

Title:	Lead-Based Paint Compliance Assurance Program—Compliance Assistance, Inspections, and Enforcement
Description:	EPA has issued guidance to help ensure compliance with rules designed to protect the public from lead-based paint hazards. Compliance assistance, inspections, and enforcement are all tools that will be used to help ensure that children are safe from lead-based paint hazards. EPA regions have provided compliance assistance to the real estate industry and others



	subject to the Residential Disclosure Rule. EPA also is following up on complaints from the public about potential violations of this Rule. With regard to other lead-based paint requirements, a federal compliance and enforcement program addressing abatement, certification, and training will operate in those states without an authorized program.
Contact:	Office of Enforcement and Compliance Assurance, Claude Walker, 202-564-4042 or Fran Jonesi, 202-564-7043.
Title:	Examples of Regional Lead-Based Paint Activities:
Description:	As illustrated below, each EPA regional office conducts programs to reduce lead-based paint hazards:
Region 1:	Region 1 publicizes the new real estate notification rules that are designed to protect children from lead poisoning and lead paint, and to remove children from premises undergoing renovation. Contact Maureen McClelland, 617-565-3543.
Region 2:	The Region is conducting a study of high risk urban communities affected by the real estate disclosure regulations to ensure that realtors are informing sellers and landlords of their responsibilities and properly informing buyers and lessees. Outreach to community groups and compliance assistance to the regulated community also target these areas. Contact Louis Bevilacqua, 732-321-6671.
Region 5:	The Region has developed initiatives for public awareness and compliance with lead-based paint standards for daycare centers and other buildings frequented by children. Outreach to realtor groups raises awareness and helps prevent parents from buying or renting residential property that might expose children to unsafe lead-based paint conditions. Contact Phyllis Reed, 312-886-6018.
Region 6:	Region 6 is providing outreach to assist the real estate industry in meeting the requirements of the lead-based paint regulations, and to inform parents about lead-based paint exposure and hazards. These actions will allow families to take the necessary steps to minimize risk to children. Contact Anna Treinies, 214-665-8348.
Region 7:	Through a lead-based paint outreach program, the Region is testing blood lead levels, developing certification training classes for nonprofit organizations, providing compliance assistance, conducting presentations and mass



mailings, and developing an Internet home page for children. The Region purchased X-ray fluorescence equipment to test the level of lead in tribal homes. Contact Tom Hogan, 913-551-7684.

Region 9: Region 9 maintains an outreach program to implement the Residential Lead-Based Paint Hazards Reduction Act. State and tribal grants are awarded to establish programs for preventing or eliminating lead poisoning in children and to help community-based organizations conduct public programs on the dangers of lead. The Region also provides technical assistance and training. Contact Paula Bisson, 415-744-1128.

Title: Lead-Based Paint Compliance Monitoring and Enforcement Cooperative Agreement Funding for States

Description: In fiscal year 1997, EPA provided $1 million to 13 states to enhance the state enforcement component of their lead-based paint programs.

Partners: State agencies

Contact: Office of Enforcement and Compliance Assurance, Jack Neylan, 202-564-5033 or Karen Taimi, 202-564-5046

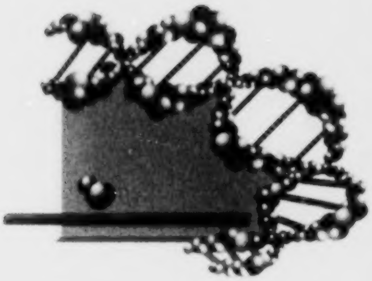
Title: Community/University Partnership for Lead Education

Description: Through an EPA grant, Xavier University has developed a project to identify, prevent, and intervene in instances of lead poisoning of at-risk children residing along the Mississippi River Chemical Corridor. The university is working with ten community-based organizations to develop and promote lead education and training for community members, health care providers, children, and elementary and secondary teachers. The program includes lead screening and lead testing in homes to reduce exposure in children.

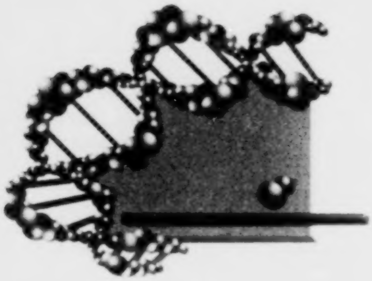
Contact: Office of Enforcement and Compliance Assurance, Daniel Gogal, 202-564-2576

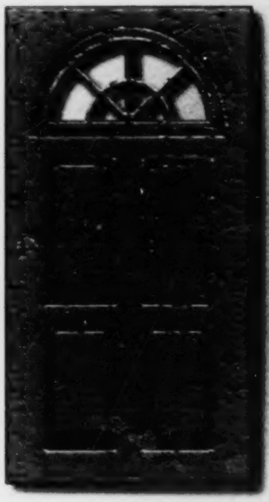
Title: The Childhood Lead Action Project

Description: EPA is assisting the Rhode Island Childhood Lead Action Project to prevent childhood lead poisoning through education, parent support, and



	advocacy. The Childhood Lead Action Project has conducted lead education and outreach in high-risk, low-income Hispanic, African-American, and Asian communities.
Contact:	Region 1, Maureen McClelland, 617-565-3543 or Jim Bryson, 617-565-3836
Title:	Urban Environmental Initiative
Description:	EPA Region 1 works with community leaders to address critical urban environmental issues, including lead poisoning. Efforts include the "Communities Saving Their Children's Future" series of workshops to train residents in the prevention of early childhood lead poisoning. Region 1 also provides funds to its partners for outreach and educational campaigns directed toward parents and human service providers in the inner city.
Partners:	Boston University School of Public Health, Boston Department of Environmental Health, National Center of Lead-Safe Housing, The Medical Foundation of Boston, and Childhood Lead Action
Contact:	Region 1, Lois Adams, 617-565-3487
Title:	Lead Poisoning Prevention Curriculum
Description:	Through a cooperative agreement with the Education Development Center, EPA Region 1 has assisted in developing and distributing "Health Beginnings: Lead-Safe Families," an English-as-a-second-language curriculum on lead poisoning prevention. Almost 400 regional learning centers have received the curriculum and provided thousands of families with critical information on avoiding lead exposure.
Contact:	Region 1, Maureen McClelland, 617-565-3543 or Jim Bryson, 617-565-3836
Title:	New England Lead Coordinating Committee
Description:	EPA and The New England Lead Coordinating Committee, through a cooperative agreement with Tufts University, facilitates coordination of lead poisoning prevention among the states, EPA, and other federal agencies. More than $130,000 has been granted to grassroots community





organizations working to prevent lead poisoning, many of which focus of children's health issues. For example, puppet shows have been developed to teach children about lead safety.

Partners: Tufts University

Contact: Region 1, Maureen McClelland, 617-565-3543 or Jim Bryson, 617-565-3836

Title: Daycare Provider Lead Awareness Course

Description: The Daycare Provider Lead Awareness Course was developed by EPA Region 1 and distributed in all New England states. State agencies and nonprofit organizations deliver the course to daycare providers.

Partners: Connecticut Department of Public Health and University of Connecticut Cooperative Extension System in West Hartford, CT

Contact: Region 1, Maureen McClelland, 617-565-3543 or Jim Bryson, 617-565-3836

Title: Vermont Lead Safety Project

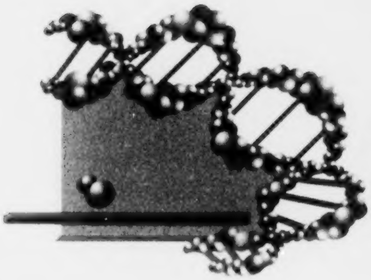
Description: The Vermont Lead Safety Project, through an EPA grant, has given hundreds of slide presentations and workshops. Children's puppet shows on lead have been performed for schools, community groups, daycare providers, hospitals, and other organizations. The staff of the project also provide free phone consultations on lead to the public.

Contact: Region 1, Maureen McClelland, 617-565-3543 or Jim Bryson, 617-565-3836

Title: AmeriCorps/EPA Neighborhood Improvement Project

Description: With EPA funding, AmeriCorps members teach Newark, NJ, residents to recognize and prevent lead and carbon monoxide poisoning through public awareness presentations. More than 2,400 residents are more aware of lead and carbon monoxide poisoning risks and what they can do to keep themselves and their children healthy.

Contact: Region 2, Louis Bevilacqua, 732-321-6671



Title: Environmental Justice Grants

Description: EPA Region 2 has awarded over 45 grants totaling approximately $1,000,000 to nonprofit grassroots organizations for projects on children's health issues, primarily to prevent lead-paint poisoning. Grant programs include projects in the Bronx, NY; Syracuse, NY; and Patterson and Newark, NJ. One grant supports statewide outreach in New York to educate parents of school-aged children about environmental health and safety hazards in schools, such as pesticides, lead, asbestos, radon, and indoor air pollution.

Contact: Region 2, Melva Hayden, 212-637-5027

Title: Superfund Risk Assessment for Children

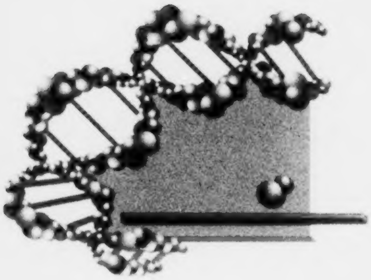
Description: Using the Integrated Exposure and Uptake Biokinetic (IEUBK) model, EPA Region 2 and other EPA regions have improved assessments of risks to children posed by Superfund sites. The IEUBK model allows researchers to evaluate risks to children of ages six months to six years through soil ingestion or inhalation. By predicting changes in blood lead levels in the population, EPA can evaluate the need for remediation. Potential risks to children trespassing onto abandoned hazardous waste sites also are evaluated.

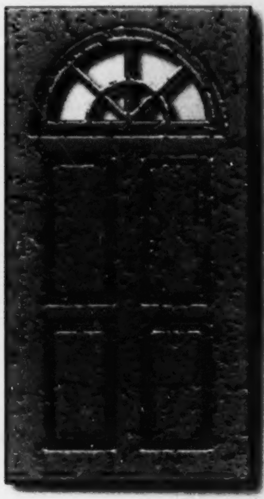
Contact: Region 2, Marion Olsen, 212-637-4313

Title: An Adult Lead Model at Hazardous Waste Sites

Description: EPA's Region 2 Superfund program has started evaluating risks to women of childbearing age and their prospective children from lead exposure at commercial and industrial sites. This allows the potential for elevated blood lead levels in the developing fetus to be taken into consideration when determining whether to proceed with cleanup of lead contamination. The model is being used by other EPA regions, states, and contractors.

Contact: Region 2, Mark Maddaloni, 212-637-4315





Title: Vega Baja Solid Waste Disposal Site Assessment

Description: EPA Region 2 conducted various tests to determine lead levels at the Vega Baja landfill site in a rural area of Río Abajo Ward, Puerto Rico. Inspection of the site revealed that lead levels in soil samples collected from the residential area (200 dwellings on 11 acres) were higher than expected. Additional samples were collected to explore possible lead hazards in soil, tap water, and homegrown fruits and vegetables. Blood lead testing of 42 children, ages one to six, living on the Vega Baja site revealed no indication of health concerns at the present time, although isolated soil hot spots remain a potential health threat.

Partners: ATSDR, Food and Drug Administration, and Puerto Rico Department of Health

Contact: Region 2, Jose Font, 212-637-6951

Title: Roebling Playground Remediation

Description: Lead paint contamination was removed from two playgrounds near the Roebling Steel Superfund site in New Jersey. Cleanup activities helped protect the health of children using the playgrounds. EPA Region 2 continues to monitor the playgrounds in order to protect against recontamination from nearby structures.

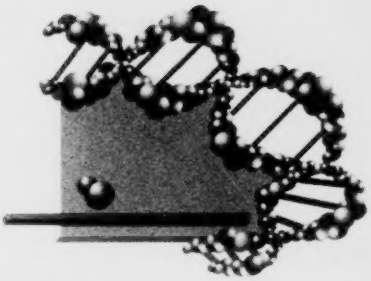
Contact: Region 2, Mark Maddaloni, 212-637-4315

Title: Program-Specific Activities and Strategies

Description: EPA Region 3 is working with the CDC and state agencies to promote community-based assistance projects to reduce and prevent childhood lead poisoning. Activities designed to protect children include: developing data on cumulative and simultaneous exposures from industrial chemical facilities; providing families with improved access to environmental and health information; developing data systems to facilitate better detection of children's unmet health needs; and measuring program improvements.

Partners: Centers for Disease Control and Prevention

Contact: Region 3, Aquanetta Dickens, 215-566-2080



Title: Urban Environmental Initiatives

Description: Region 3 is pursuing environmental and enforcement activities in urban areas that have high concentrations of industrial activity coincident with populations that are disadvantaged and largely minority. These areas are: Baltimore, Maryland; Chester and South/Southwest Philadelphia, Pennsylvania; and Anacostia, District of Columbia. The Childhood Lead Poisoning Prevention Program provides outreach designed to inform parents of the health risks of lead dust and to train them to protect their children from these threats. Cleaning kits are distributed to families with at-risk children in order to reduce the levels of lead-bearing dust in these homes.

Contact: Region 3, Reggie Harris, 215-566-2988

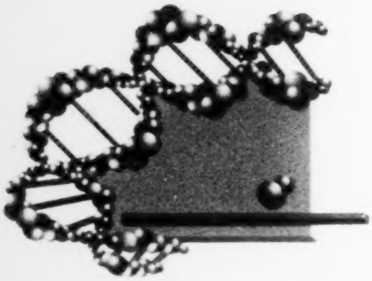
Title: Superfund Evaluation of Lead-Contaminated Soil

Description: Region 6 has taken response actions at three large lead sites (National Zinc, RSR, and Eagle-Picher) and is planning for another at Tar Creek. Concerted efforts are being made with state health departments to provide hygiene information to residents, schools, and daycare centers for minimizing children's exposure to lead. For example, at the National Zinc site, EPA worked with Oklahoma's Department of Environmental Quality and Department of Health to develop educational programs for preventing children's exposure to lead. The agencies held seminars during a blood sampling campaign to discuss lead exposure prevention techniques with schools and daycare centers. Schools were provided material for children to take home to parents. At the RSR site, 1,500 families in seven neighborhoods received this type of information, and residential yard cleanup was conducted on four sites.

Contact: Region 6, Ghassan Khoury, 214-665-8515 or Don Williams, 214-665-2197

Title: Industrial Chrome Plating Emergency Response

Description: EPA Region 8 emergency response personnel are conducting response activities on the Industrial Chrome Plating Site in Denver, Colorado. A school is located near the plating facility, and local children used the property as a playground and its back alley as a school walkway. Industrial Chrome Plating is an abandoned electroplating facility that stored hazardous



materials, including acidic, caustic, oxidizing, and combustible materials associated with chrome, nickel, and lead plating. EPA has fenced the property and is removing hazardous materials and contamination from the site for disposal.

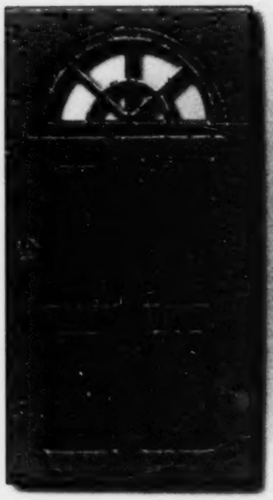
Contact: Region 8, Duc Nguyen, 303-312-6509

Title: Residential Cleanups of Lead-Contaminated Soil

Description: A number of EPA Region 8 Superfund residential cleanups of lead-contaminated soil are being conducted to protect children under seven years of age from lead poisoning. These cleanups are intended primarily to reduce exposure occurring through ingestion of lead-contaminated soil. Sites being cleaned up are:

- Smuggler Mountain, Colorado, 500 families
- Leadville, Colorado, 1,700 families including 550 children
- East Helena, Montana, 2,100 families including 800 children
- Butte/Silver Bow Creek, Montana, 4,000 families
- Herriman, Utah, 75 families
- Bingham Creek, Utah, 1,100 families including 1,000 children
- Sandy, Utah, 200 families including 250 children
- Midvale, Utah, 600 families including 240 children
- Murray Smelter, Utah, 100 families including 70 children.

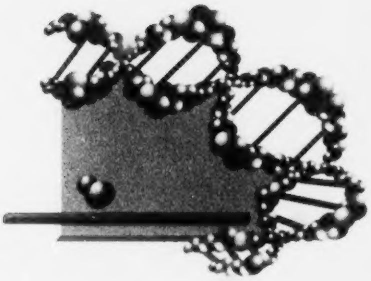
Blood lead levels were tested in 200 children of ages ten or less at the Butte/Silver Bow Creek site and in 45 children at the Smuggler Mountain site.



Contact: Region 8, Susan Griffin, 303-312-6651

Title: Environmental Epidemiological Survey of Lead Exposure of Children in Tijuana, Mexico

Description: EPA and researchers from the University of California-Irvine are conducting an epidemiological study of blood lead concentration. The research includes 1,600 Tijuana children of ages one to six years. Scientists are exploring sociological and demographic factors related to lead exposure.



The project will raise awareness of the problems associated with children's exposure to lead among Tijuana government officials, industries, and citizens. Work completed includes renovation of a nurses' coordination facility, development of a Spanish language survey instrument, training on blood lead analysis for Mexicans in San Diego, and agreements with the medical services in Tijuana to permit the collection of samples from children. Approximately 100 children have been screened over the past year.

Partners: University of California-Irvine and Centers for Disease Control and Prevention

Contact: Region 9, Winona Victery, 415-744-1021

Title: Tribal Children Blood Lead Hazards

Description: Region 10 is funding a region-wide information and education program designed to reduce exposure of tribal children to lead. During 1996, EPA awarded $346,268 in grants to Washington, Alaska, and Idaho for lead information outreach to seven tribes and for blood lead level testing in tribal children.

Contact: Region 10, Barbara Ross, 206-553-1985

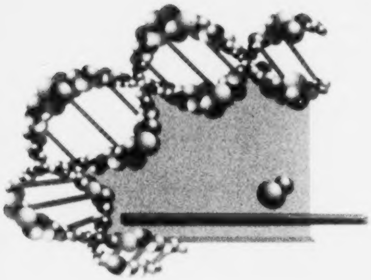
Title: Oregon Legal Services Corporation Grant

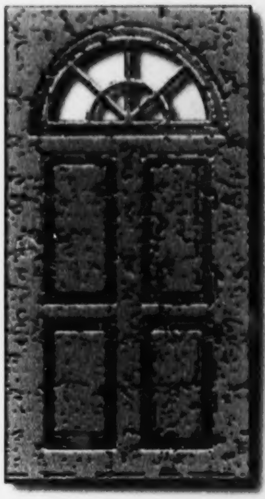
Description: Region 10 provided funds to the Oregon Legal Services Corporation for outreach on lead poisoning to low-income rural and minority families in nine Oregon counties. The project will:

- develop prevention methods,
- identify children at risk,
- direct at-risk children to medical staff for blood lead level testing,
- obtain information about risk factors in rural housing, and
- advocate statewide lead abatement programs to identify children at risk.

Information about lead poisoning hazards will be provided to 8,000 people, including more than 80 percent of the area's families. The project will identify specific rural concerns for use in state and local plans. Blood lead level testing of children between the ages of two and four is underway.

Contact: Region 10, Susan Morales, 206-553-8580





Title: Migrant Worker Housing Facility Lead and Arsenic Survey

Description: With EPA assistance, the Washington State Department of Health conducted an environmental lead and arsenic study at five migrant worker housing facilities in North Central Washington. Housing was located in or adjacent to orchards where soil was thought to be contaminated with lead arsenate used in the past to control the codling moth in apple and pear orchards. Data suggest that lead and arsenic remain at these facilities and a health risk may exist. As a result, efforts are being made to provide risk information to the residents. A strategy for preventing lead and arsenic exposure to young children will be implemented prior to the next harvest season.

Contact: Region 10, Barbara Ross, 206-553-1985

Title: Bunker Hill Superfund Site Childhood Blood Lead Study

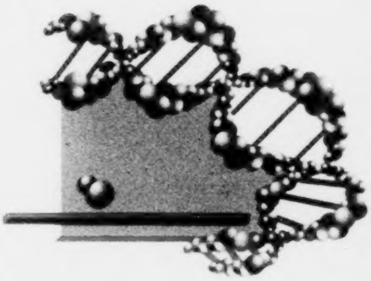
Description: EPA Region 10 is conducting a childhood blood lead study in the communities surrounding the former lead smelter at the Bunker Hill Superfund Site near Kellogg, ID. Since 1974, every child nine years of age or younger has been screened annually. The study is used to direct the efforts of the local health intervention program and to target residential cleanup activities. Approximately 7,000 adults and 400 children in the community are affected. Project results show a 30-fold decrease in the percent of children whose blood lead concentrations exceed ten micrograms per deciliter, a ten-fold drop in average blood lead concentrations, and a decrease in the percentage of children living on contaminated yards.

Partners: Idaho Department of Environmental Quality

Contact: Region 10, Nancy Wilson, 206-553-1237

Title: Yakima Children Blood Lead Study

Description: EPA awarded the Washington State Department of Health more than $2.5 million in grant funds for determining the extent of threats to children caused by lead paint and lead dust across the state. A study in the Yakima, WA, area found that 9 percent of about 170 children (six months



to three years old) had elevated blood lead levels. The Agency will rely on education and awareness about lead poisoning to reduce blood lead levels in children.

Contact: Region 10, Barbara Ross, 206-553-1985

Title: Monitoring Compliance with and Enforcing the Requirements of the National Drinking Water Regulations for Lead and Copper

Description: EPA is currently evaluating compliance of public water systems with the national primary drinking water regulations for lead and copper. These regulations established monitoring and treatment requirements for public water systems. This project is designed to ensure compliance by all public water systems, thereby reducing the amount of lead children consume from drinking water. So far, several hundred enforcement actions have been taken by EPA and the states against systems that have failed to meet the initial monitoring requirements of the rule. Currently, EPA is evaluating data on whether systems have complied with the subsequent requirements in the rule (*e.g.*, installation of corrosion control, beginning of lead service line replacement). EPA will be working with the states to take appropriate actions to return violators to compliance.

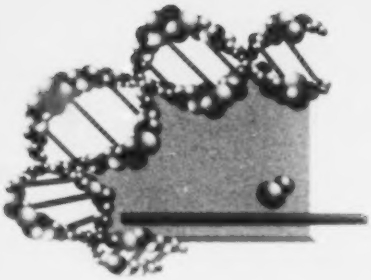
Partners: State agencies

Contact: Office of Enforcement and Compliance Assurance, Brian Maas, 202-564-6019 or Betsy Devlin, 202-564-4054

Title: Investigations and Enforcement at Nonferrous Metal Smelters

Description: EPA is conducting investigations and enforcement activities at nonferrous (other than iron) metal smelters in an effort to reduce overall emissions at facilities that violate state or federal regulations. Those in violation may be emitting lead and other toxic metals into the air, which may contaminate schools and lawns where children play. Sources have been targeted for inspections to determine compliance with state and federal requirements.

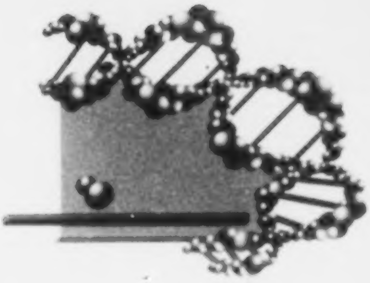
Contact: Office of Enforcement and Compliance Assurance, Cary Secrest, 202-564-8661



Title:	Rulemaking on Do-It-Yourself Debris from Removal of Lead-Based Paint
Description:	EPA will clarify the regulations concerning disposal of debris generated from renovations and remodeling that involves removal of lead-based paints from private households. This program is aimed at protecting children because they are most at-risk from lead-based paint in households. The Agency will encourage homeowners and contractors to accelerate the removal of lead from children's home environments by addressing disposal costs for lead-contaminated debris.
Contact:	Office of Solid Waste and Emergency Response, Rajani Joglekar, 703-308-8806

Title:	Targeting Criminal Violations that Threaten Health and Safety of Children
Description:	EPA is implementing strategies to expose potential criminal violations that threaten the health and safety of children. Criminal enforcement actions can have direct relevance to children's health. For example, 17 children showed high blood lead levels after lead mining waste from railroad cars was illegally disposed of in a rural creek bed near the children's homes. Criminal actions were pursued in this case and others.
Contact:	Office of Enforcement and Compliance Assurance, David Montoya, 202-564-2548

Title:	Lead in Children's Products
Description:	EPA and the Consumer Product Safety Commission work together to monitor the use of lead in consumer products, especially those used by children in the United States. Examples of products that have posed exposure problems in the past include crayons imported from China, toys decorated with lead-based paint, and non-glossy vinyl mini-blinds. Both agencies currently are reviewing studies of lead in other children's vinyl products.
Partners:	Consumer Product Safety Commission
Contact:	Office of Prevention, Pesticides, and Toxic Substances, Tova Spector, 202-260-3467



Title: Lead-Based Paint Activities in Residences and Daycare Centers—State and Tribal Program Development

Description: Safe removal of lead-based paint requires a professional who knows how to evaluate and remove the hazard without worsening the problem. To ensure that homeowners and others who need these services can locate trained professionals, EPA issued rules on the training and certification of lead-based paint inspectors and abatement professionals. The rule also includes procedures for states and tribes to apply to EPA for authorization to set up their own programs. States and tribes have been given two years to apply. After August 31, 1998, EPA will administer the program in any remaining states and tribal areas.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Mark Henshall, 202-260-5089

Title: Lead-Based Paint Activities in Buildings and Other Structures

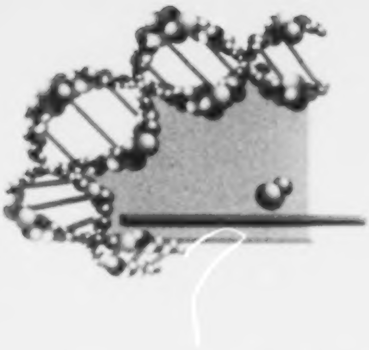
Description: In September 1977, EPA took comments on a series of questions EPA had formulated to better understand the industrial painting sector prior to developing new regulations for lead-based paint activities in buildings and other structures. EPA will develop regulations similar to those for lead-based paint activities in residences and daycare centers. Over the next year, EPA will gather information on the industry. The proposed rule will be issued for public comment in 1998.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Ellie Clark, 202-260-3402

Title: Disposal of Lead-Based Paint Debris

Description: EPA is exploring regulatory alternatives to lower the cost of disposal of lead-based paint waste while continuing to protect human health and the environment. These regulations will make abatement less expensive so that more families will be able to remove lead-based paint from their homes.

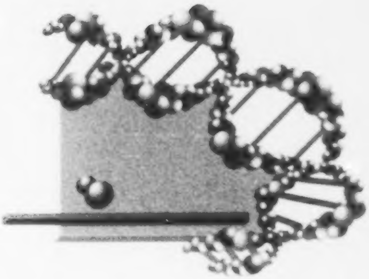
Contact: Office of Prevention, Pesticides, and Toxic Substances, Tim Torma, 202-260-4595



Title:	Evaluating the Risks of Lead Hazards from Renovation and Remodeling
Description:	The 1992 Lead Hazard Reduction Act required EPA to assess the risk of exposure to lead resulting from renovation and remodeling of housing, commercial buildings, and public buildings constructed before 1978. EPA is currently completing studies of renovation and remodeling activities. EPA will use the results and consult with stakeholders to determine if revisions to the training and certification rules for lead-based paint inspectors and abatement professionals are needed.
Contact:	Office of Prevention, Pesticides, and Toxic Substances, Dana M. Screws, 202-260-1562

Title:	Lead-Based Paint Hazard Standards
Description:	EPA is developing standards that specify the condition and location of lead-based paint in pre-1978 housing and child-occupied facilities that can result in exposure to dangerous levels of lead. The regulation also will specify when lead in household dust and residential soil are at dangerous levels, and provide objective criteria for identifying hazards in housing.
Contact:	Office of Prevention, Pesticides, and Toxic Substances, Jonathan Jacobson, 202-260-3779

Title:	Lead-Based Paint in Housing Disclosure Requirements and Implementation
Description:	In March 1996, EPA and HUD issued final regulations implementing the disclosure requirements mandated under Section 1018 of the Residential Lead-Based Paint Hazard Reduction Act of 1992. The regulations impose obligations on sellers and lessors. These provisions will ensure that families receive lead hazard information before they buy or rent housing built before 1978. The new rule recognizes the public's right to know about potential hazards in the home and options for reducing those hazards. The Agency is working with national and local media, child and housing advocates, the real estate community, and local community leaders to highlight awareness of the issue and the law, and to ensure the smooth implementation of the rule.
Partners:	U.S. Department of Housing and Urban Development and Alliance to End Childhood Lead Poisoning



Contact: Office of Prevention, Pesticides, and Toxic Substances, Dayton Eckerson, 202-260-1561 or Megan Carroll, 202-260-7269

Title: Redefining Childhood Blood Lead Level Reduction Goals and Lead Strategic Plan

Description: EPA is revising the Environmental Lead Goals for 2005 based on new data from the Third National Health and Nutrition Examination Survey (NHANES III) Phase II report published in 1997. EPA and the CDC will evaluate all applicable data.

Partners: Centers for Disease Control and Prevention

Contact: Office of Prevention, Pesticides, and Toxic Substances, Dana M. Screws, 202-260-1562

Title: Environmental Indicators Bulletin

Description: As part of a series of environmental indicator bulletins, EPA is developing the *Lead in the Environment* bulletin. This public outreach document provides information on the sources of lead in the environment, the state of human health related lead exposure, and responses taken to reduce lead exposures.

Contact: Office of Policy, Planning, and Evaluation, Susan Auby, 202-260-4901

Title: National Lead Information Clearinghouse

Description: The National Safety Council, under a cooperative agreement with EPA, operates the National Lead Information Clearinghouse—a valuable resource for the public on lead hazards. Parents, homeowners, state and local officials, and anyone else can speak to a trained lead specialist and receive answers over the phone, request written materials, or obtain references to other resources. The Clearinghouse operates in both English and Spanish and maintains a web site and fax service to better serve the needs of the public (see Chapter 11).

Partners: U.S. Department of Housing and Urban Development and Centers for Disease Control and Prevention

Contact: Office of Prevention, Pesticides, and Toxic Substances, Georgene Cooper, 202-260-3904

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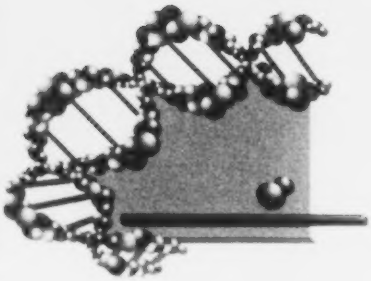


Title: Lead Poisoning Prevention and Lead Hazard Awareness Public Education and Outreach Grant Program

Description: In 1997, EPA announced a new lead poisoning prevention and lead hazard awareness public education and outreach grant program. The purpose of the program is to increase lead-based paint hazard awareness and promote lead-poisoning prevention to high-risk target audiences. EPA is particularly interested in supporting projects conducted by smaller organizations, such as local governments, community groups, and other specialized non-governmental organizations operating on the local level.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Megan Carroll, 202-260-7269

Title: Lead-Based Paint Maintenance Training Program

Description: EPA and the HUD have developed a lead-safe training program for building maintenance staff. The training is designed to educate workers and their supervisors at multi-unit rental properties on techniques to use during routine maintenance to prevent lead hazards in the buildings they maintain.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Jack Primack, 202-260-3407

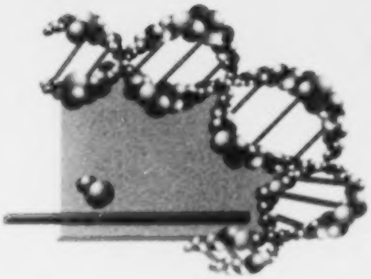
Title: Renovation and Remodeling Study Phases 1 and 2

Description: EPA is conducting a renovation and remodeling study to characterize the lead levels associated with selected renovation and remodeling activities and the blood lead levels from a survey of workers who typically engage in renovation and remodeling.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Darlene Watford, 202-260-3989

Title: Laboratory Study of Lead Cleaning Products

Description: EPA conducted a laboratory study of cleaning products. In the past, EPA has recommended the use of trisodium phosphate or powdered dishwasher detergent with a high phosphate content for cleaning dust. Based



on the study, EPA now recommends cleaning with an all-purpose cleaner or cleaner made specifically for lead. This recommendation is for cleaning after a lead-based paint abatement and for regular household cleaning. One conclusion was that the amount of effort involved in cleaning probably is more important than the choice of cleaning product.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Ben Lim, 202-260-1509

Title: Renovation and Remodeling Study Phase 3

Description: EPA is working with the University of Wisconsin to study the relationship between the incidence of renovation and remodeling activities and children's blood lead levels. Data has been collected from approximately 3,600 households. Participants were administered an extensive questionnaire by telephone. The primary goal is to determine if there is an association between elevated blood lead levels in children and renovation and remodeling activities in the home. A secondary goal is to examine the relationship between behavioral characteristics and blood lead levels.

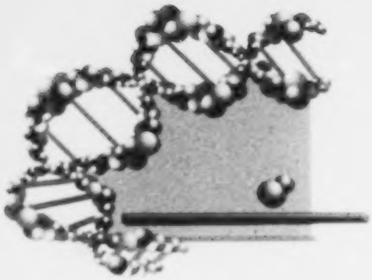
Partners: University of Wisconsin

Contact: Office of Prevention, Pesticides, and Toxic Substances, Dan Reinhart, 202-260-1585

Title: Guidance for Testing Lead Products

Description: The goal of this project is to develop guidelines and performance characteristics for the testing of lead hazard identification and lead hazard control products by third party organizations. A number of meetings with affected stakeholders are planned to gather information on how a third party testing program would work. In the past, EPA has tested lead-related products by itself.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Darlene Watford, 202-260-3989



Title: Repair and Maintenance Study

Description: This study examined the effect of different levels of lead-based paint interventions on dust and children's blood lead levels. The study includes three intervention groups, a control group of homes built after 1978, and a group of homes previously abated. The three intervention groups applied a series of control measures that cost about $1,500 per home for the least intensive intervention, about $3,000 per home for the next level of intervention, and $6,000-7,000 per home for the most expensive intervention. Reports on the outcome will be published in 1998.

Partners: Kennedy Krieger Research Institute

Contact: Office of Prevention, Pesticides, and Toxic Substances, Ben Lim, 202-260-1509

Title: Milwaukee Low-Cost Intervention Studies

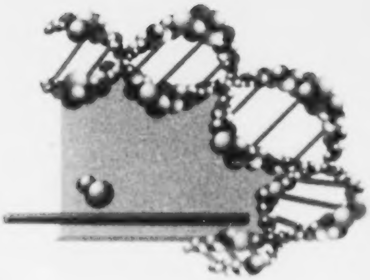
Description: In cooperation with the Milwaukee Health Department, EPA is assessing the effectiveness of in-home visits by trained representatives of the Health Department and of low-cost abatement methods. The in-home visits cover hygiene, nutrition, cleaning, and reducing lead exposure, and they cost approximately $100 per visit. The abatement methods include paint stabilization and window treatments.

Partners: City of Milwaukee Health Department and University of Wisconsin

Contact: Office of Prevention, Pesticides, and Toxic Substances, Brad Schultz, 202-260-3896

Title: National Lead Laboratory Accreditation Program (NLLAP)

Description: The NLLAP provides a list of laboratories recognized by EPA as being proficient for analysis of lead in paint, dust, and soil. Two additions to the NLLAP are planned. First, the proficiency testing part of NLLAP will be changed to a double-blind system that more closely represents typical laboratory performance. Second, the NLLAP will be expanded to include field-portable technologies commonly used to test for lead in paint, dust, and soil.



Partners: National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, and U.S. Department of Housing and Urban Development

Contact: Office of Prevention, Pesticides, and Toxic Substances, John Scalera, 202-260-6709

Title: Assessment of the Effectiveness of Risk Assessments

Description: Risk assessments are conducted to identify and control lead hazards. The purpose of this project is to determine if risk assessments are effective in identifying hazards that would cause a child to have an elevated blood lead level.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Susan Dillman, 202-260-5375

Title: CD-ROM Release of Technical Reports

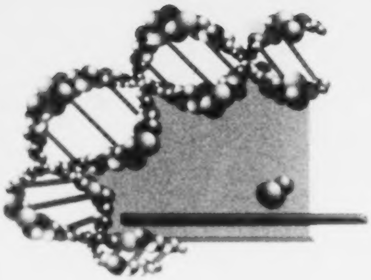
Description: The purpose of this project is to produce and release a CD-ROM copy of technical lead reports dealing with lead in paint and soil, and some of the larger data sets associated with those reports. The release of the CD-ROM will make these reports and data available to a wider audience than in the past.

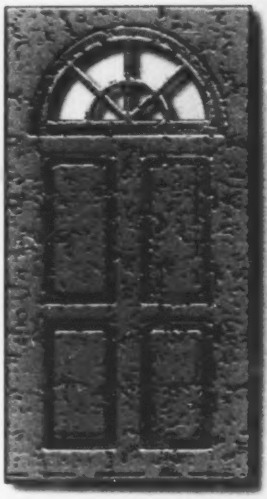
Contact: Office of Prevention, Pesticides, and Toxic Substances, Sam Brown, 202-260-2282

Title: Dissemination of Technical Information

Description: EPA has published a substantial number of documents in recent years on a variety of lead issues. Staff continuously update EPA's lead home page with current information, publicize available reports, and speak at professional meetings in order to make the public aware of the available information.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Ron Morony, 202-260-0282 or John Schwemberger, 202-260-7195



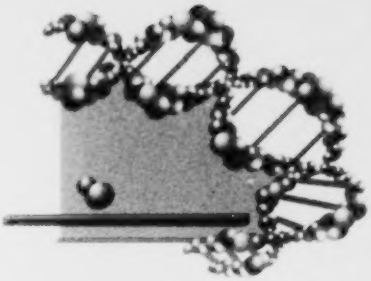


Title:	Evaluating Food Contamination Scenarios in Dietary Exposure Studies—Child Dietary Lead Study
Description:	EPA is conducting a study to examine dietary lead exposure using experimental techniques for determining actual lead intake of children two to three years of age. The subjects live in New Jersey homes with high levels of environmental lead. Dietary exposure is being evaluated by collecting food samples representative of the foods young children eat in their homes. EPA also is collecting samples of drinking water, dust on floors, and data on skin exposure, as well as measuring blood lead levels to evaluate the potential for food to be contaminated during handling and eating by the child.
Contact:	Office of Research and Development, Maurice Berry, 513-569-7284

Title:	Effects of Lead on Adolescent Development
Description:	This study will examine the relationship between blood lead levels and adolescent development and maturation. Both human and laboratory studies suggest that relatively low levels of lead exposure may affect the growth and sexual maturation of the child.
Partners:	Indo-U.S. Collaborative Program in Science and Technology
Contact:	Office of Research and Development, Gary Kimmel, 202-260-5978

Title:	Long-Term Potentiation as a Model System for Cognitive Function
Description:	This study utilizes lead as a model compound for establishing methods of identifying chemicals that can disrupt brain function over the long term by affecting nerve cell development. Using a biologically-based dose-response (BBDR) approach, the research will try to establish a direct link between the many alterations in cell function that accompany lead exposure and the observed effects of lead on intellectual function in children.
Contact:	Office of Research and Development, Elaine Francis, 202-564-6789

Title:	The Integrated Exposure Uptake Biokinetic (IEUBK) Model
Description:	This project will broaden the usefulness of the IEUBK Model for assessing lead in children. The improved model will provide better estimates of



lead in blood, bone, and other tissues for children in the first six months of infancy. The current model does not estimate concentrations in these tissues until after six months due to a lack of information on the maternal contribution to fetal lead burdens. The project will incorporate data on the mobilization of bone-lead during pregnancy and the uptake and distribution of this lead into fetal tissues.

Contact: Office of Research and Development, Robert Elias, 919-541-4167

Endocrine Disruptors

Title: Test Guidelines for Developmental Neurotoxicity

Description: EPA is working with the Organization of Economic Cooperation and Development to produce an international testing guideline that will evaluate the effects of prenatal and early post natal exposure to chemicals on the developing nervous system of laboratory animals.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Susan Makris, 703-305-5222

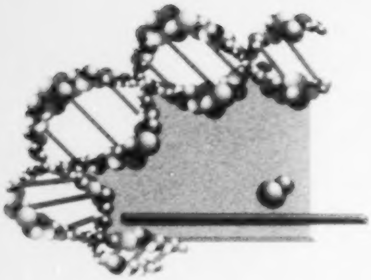
Title: Test Methodologies for Endocrine Disruptors

Description: The Food Quality Protection Act of 1996 mandates that EPA develop screening and testing methods for certain kinds of endocrine disruptors. Supported by the work of the Endocrine Disruptor Screening and Testing Advisory Committee, EPA is developing screens and tests for the evaluation of potential effects mediated by estrogens, androgens, and thyroid hormones.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Gary Timm, 202-260-1859

Title: Pollutant-Specific Risk Assessments

Description: EPA is studying pollutant-specific assessments that address risks to children. Risks under evaluation include exposure to PCBs, environmental tobacco smoke, and mercury. Researchers also are conducting a reassessment of dioxin risks to children.

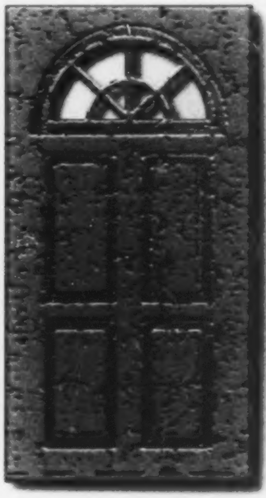


Contact: Office of Research and Development, Jim Cogliano, 202-260-3814; Jennifer Jinot, 202-260-8913; Gary Kimmel, 202-260-5978; Sherry Selevan, 202-260-2604; or Kate Mahaffey, 513-569-7957

Title: The Effects of Pesticides on Reproductive Toxicity

Description: Research on the effects that perinatal exposures to pesticides have on the function of the reproductive system are being examined. The prolonged gestation period of rabbits closely approximates the infancy-adolescence phase in humans. Male rabbits are being evaluated for alterations in endocrine markers (such as hormone levels), semen (sperm number, motility, and morphology), fertility, and reproductive organ changes.

Contact: Office of Research and Development, Gary Klinefelter, 919-541-5779



Title: Effects of Endocrine Disruptors on Disposition of Testosterone in Adult and Developing Rats

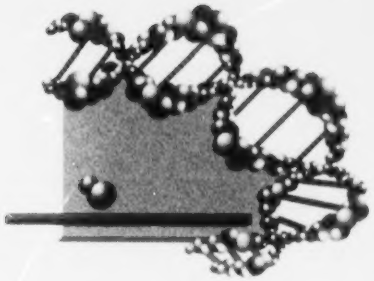
Description: This project will measure changes in testosterone in rats administered anti-androgenic chemicals (one form of an endocrine disruptor). Project results will aid understanding of how anti-androgens affect adolescent and adult rats.

Contact: Office of Research and Development, Teresa Leavens, 919-541-4431

Title: Mechanisms of Abnormal Reproductive Development Produced by Endocrine Disrupting Chemicals Administered during Critical Developmental Periods

Description: The purpose of this research is to identify mechanisms of toxicity and to develop biological models. These models will help to assess the severity of the risk of endocrine disruptors to human health. Several endocrine disrupting chemicals that primarily target the reproductive system of developing and adult animals are under investigation.

Contact: Office of Research and Development, Earl Gray, 919-541-7750 or William Kelce, 919-541-1580



Title: Effects of Environmental Toxicants on the Steroid Hormone Pathway

Description: This research will characterize the toxic effects of environmental substances (4-tert-octylphenol, nonylphenol, bisphenol A, phytoestrogens) on steroid receptors; address differences in age, gender, and target tissue sensitivities; identify pathways through which toxics alter steroid receptor function; and demonstrate how such changes relate to altered fertility.

Contact: Office of Research and Development, Susan Laws, 919-541-0173

Title: Endocrine Disruptors

Description: EPA Region 5 has initiated several forums to increase the understanding of endocrine disruptors. Activities include hosting a symposium with national experts to discuss endocrine disruptors and policy implications for the Great Lakes Basin; providing presentations about recent research on endocrine disruptors for tribal representatives, the public, and other regional staff; including endocrine disruptors as contaminants of concern at Superfund sites; and funding grants for research on endocrine disruptors.

Contact: Region 5, Amy Pelka, 312-886-9858 or Lara Pullen, 312-886-0138

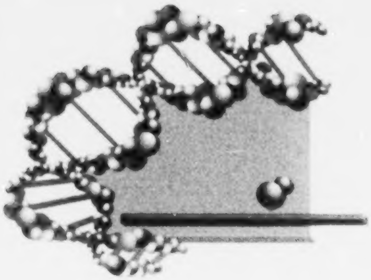
PCBs and Dioxin

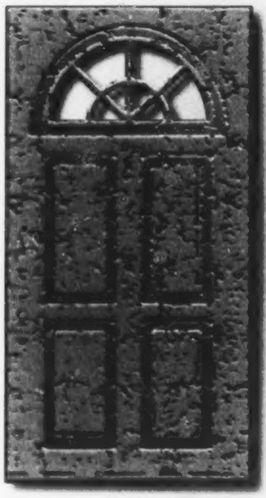
Title: Polychlorinated Biphenyls (PCBs) and Polychlorinated Benzodifuran (PCDF) Biomarkers of Risk Assessment in Adolescent Children and Mothers

Description: This is a comparison study of endocrine and cytochrome biomarkers for risk assessment of developmental toxicities in humans induced by PCBs and PCDF. The study will examine effects in mother rats and their sexually mature adolescents that have been exposed to high levels of PCB/PCDF since conception. Biomarkers (induction of cytochrome enzymes and serum levels of endocrine hormones) will be measured in the subjects. Adverse health impacts on sexual maturation, menstrual cycles, neurobehavioral development, and growth will be examined.

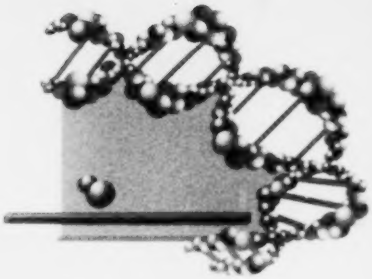
Partners: Mississippi State University

Contact: Office of Research and Development, David Reese, 202-564-6919





Title:	Neurotoxicity of PCBs
Description:	This project examines the long-term consequences of developmental PCB exposure in rats. PCB-induced changes in calcium homeostasis in the brain are being examined as a basis for long-term behavioral effects.
Contact:	Office of Research and Development, Prasada Kodavanti, 919-541-7584
Title:	Developmental Toxicity of PCBs
Description:	This project focuses on examining whether perinatal exposure to PCBs alters the development of learning and memory behavior in rats. Researchers are studying whether these alterations are associated with changes in neurotransmitters (chemicals that transmit signals in the brain) in the central nervous system. The physiology of chemical-induced thyroid dysfunction also is being investigated.
Contact:	Office of Research and Development, Christopher Lau, 919-541-5097
Title:	The Ototoxicity of Developmental Exposure to PCBs
Description:	This project tests the hypothesis that developmental exposure of rats to PCBs results in abnormal development of the hearing system. Researchers also are studying whether this toxic effect is related to alterations in thyroid hormone levels.
Contact:	Office of Research and Development, Kevin Crofton, 919-541-2672
Title:	Toxicokinetics in Pregnant and Lactating Rats
Description:	The amount of TCDD, a dioxin, transferred from mothers to fetal tissues is being assessed in rats in order to understand the effects of dioxin concentrations on development. Researchers are determining tissue concentrations following single or continuous exposures, and examining the possibility of transferring dioxin from mothers to nursing infants through breast milk.
Contact:	Office of Research and Development, Linda Birnbaum, 919-541-2655 or Christine Hurst, 541-754-4739



Title: PCB Compliance Monitoring Cooperative Agreement Funding for States

Description: EPA provides funds to 14 states to carry out PCB compliance monitoring activities. States make referrals to EPA on potential violations of federal requirements that require clear identification and marking of PCBs and proper use and disposal.

Partners: State agencies

Contact: Office of Enforcement and Compliance Assurance, Jack Neylan, 202-564-5033 or Karen Taimi, 202-564-5046

MERCURY

Title: Great Lakes Binational Toxics Strategy

Description: This Canada-U.S. strategy seeks to eliminate persistent toxic substances, such as mercury, PCBs, lead, and dioxins/furans from the Great Lakes Basin. The strategy sets specific percentage reduction targets for many of these substances. For example, the strategy calls for a 50 percent reduction in the use and release of mercury.

Contact: Region 5, Elizabeth LaPlante, 312-353-2694

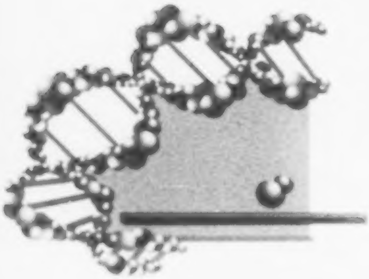
Title: Promulgation of Standards for Municipal Waste Combustion (MWC)

Description: Municipal waste combustors (MWCs) located primarily in urban areas emit mercury, dioxin, lead, and other pollutants related to developmental problems and birth defects. EPA's MWC rules of 1995 were struck down by the courts in December 1996 because of a challenge by a municipality. However, EPA has filed a petition to vacate a portion of the rules that were under dispute, allowing the remainder to go into effect. EPA's action will allow standards applicable to MWC units, representing 87 percent of the capacity in the United States, to remain in effect.

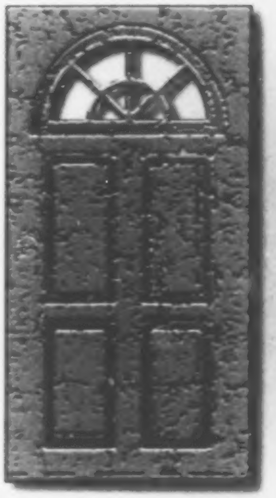
Contact: Office of Air and Radiation, Bruce Jordan, 919-541-5572

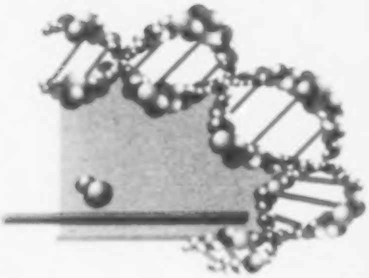
Title: Emergency Response

Description: EPA Region 8 has responded to several emergency situations at sites where children were found playing with mercury. Approximately seven



	children were affected through this type of mercury exposure at two mobile homes and an apartment during 1993. In each case, Region 8's Emergency Response Team helped local officials identify and clean up areas of contamination. EPA personnel collected air samples, tested children who had touched or played with the mercury, and disposed of contaminated materials, personal items, and soils.
Contact:	Region 8, Duc Nguyen, 303-312-6509
Title:	Mercury Neurotoxicity in Children
Description:	EPA Region 8 is conducting an outreach project aimed at increasing the awareness of emergency cleanup personnel, parents, and others about the risk of mercury exposure. A collaborative effort with the states in Region 8 focuses on identifying and preventing mercury neurotoxicity in children exposed to mercury vapors in homes. EPA has set standards and coordinated with emergency response personnel in Colorado and Wyoming to identify children who are overexposed to mercury in homes and are at risk for mental injury.
Contact:	Region 8, Chris Weiss, 303-312-6671
Title:	Grand Street Relocation
Description:	EPA provided immediate temporary relocation of the residents of a converted loft building in Hoboken, NJ, when resident families were exposed to high levels of mercury. The building's former use as a mercury vapor lamp factory was discovered when mercury began oozing from the walls and ceilings during residential renovation. Six children were among the residents; all had elevated mercury levels in their urine. Mercury levels in all residents, including children, have decreased since relocation.
Contact:	Region 2, Marian Olsen, 212-637-4313





Title: Pollutants and Neurobehavioral Function in the Czech Republic

Description: This study focuses on determining the relationship between behavioral test performance in school children and their exposure to pollutants, particularly mercury and arsenic. Elevated mercury levels in the urine of children have been associated with behavioral problems. Poorer test performances were found in children residing in heavily polluted mining areas.

Contact: Office of Research and Development, David Otto, 919-541-0479

Title: Developmental Biologically-Based Dose-Response (BBDR) Model for Mercury Vapor

Description: This project focuses on developing a biologically-based dose-response model for the effects of mercury vapor in rats following developmental exposure. Biologically-based models describe and quantify the key steps in cellular, tissue, and organism responses to environmental toxicants. Changes in prenatal and neonatal nervous systems of rats were found to be associated with mercury exposure over time. Information gained from this study will be used to determine nervous system changes in children exposed to mercury vapor and associated risks.

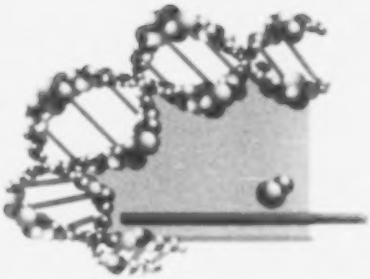
Partners: National Institute of Environmental Health Sciences

Contact: Office of Research and Development, Stanley Barone, Jr., 919-541-3916

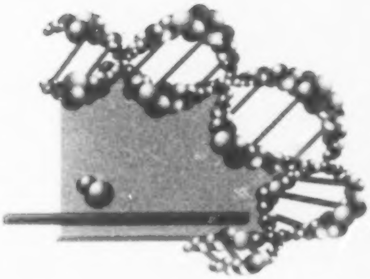
Title: Prenatal Developmental Research

Description: EPA is conducting prenatal developmental research to determine age-related sensitivities and reduce risks to fetuses and children. This research identifies and quantifies effects to provide data that will be used by the Agency to assess potential hazards to humans resulting from exposure to various environmental pollutants. EPA also is evaluating methods for using data collected in animal studies to predict health outcomes in humans.

Contact: Office of Research and Development, Robert J. Kavlock, 919-541-2771



Title:	Perinatal Exposure of Rats to Toxic Chemicals and the Effects on Immune Function Development
Description:	Immune systems in rats are being evaluated at various ages following perinatal exposure to pesticides or toxic chemicals. Researchers will determine if developmental exposure to pesticides or toxic chemicals results in persistent alterations in immune system response.
Contact:	Office of Research and Development, Ralph Smialowicz, 919-541-5776
Title:	Molecular Mechanisms Common to Toxicant-Induced Neural Injury
Description:	This project utilizes nerve cell proteins as indicators of neural damage to the developing and adult nervous system. Tests have been developed for localizing nerve cell proteins that are used to assess critical toxic effects on normal nervous system maturation, such as the growth and development of new nerve cells, dendrites, and synapses (e.g., neurogenesis, myelinogenesis, and synaptogenesis).
Contact:	Office of Research and Development, Elaine Francis, 202-564-6789
Title:	Individual Variability for Neurotoxic Effects
Description:	EPA is evaluating how neurotoxic effects vary among individuals within a sensitive subpopulation, such as children. The results will be used to more accurately predict risks in children from neurotoxics.
Contact:	Office of Research and Development, Kenneth Hudnell, 919-541-7866
Title:	Environmental Exposures and Human Neurological Function
Description:	This project involves the development and testing of neurobehavioral and electrophysiological tests for evaluating the effects of neurotoxic chemicals in humans and animals.
Contact:	Office of Research and Development, Kenneth Hudnell, 919-541-7866



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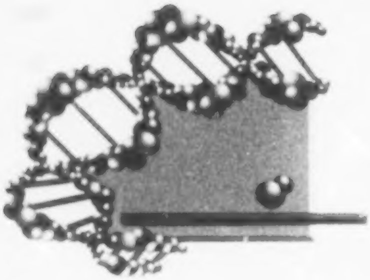

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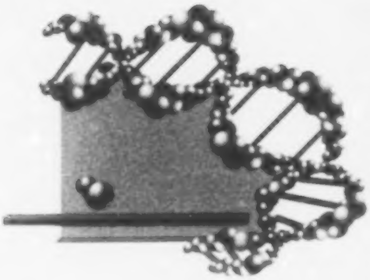

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Chapter 5

Health Effects of Pesticides

Definition

A pesticide is any substance intended to destroy, prevent, or repel pests, such as insects, weeds, fungi, and rodents. The term pesticide includes numerous types of substances designed for different purposes. For instance, herbicides kill unwanted plants, fungicides kill fungi, rodenticides kill rodents, and disinfectants kill microorganisms. Although many pesticides are synthesized from petroleum, some are derived from natural origins.

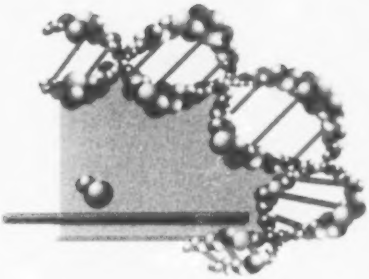
Childhood Pesticide Facts

- Children develop leukemia three to nine times more often when pesticides are used around their homes.(1,2)
- Brain tumors and other cancers in children have been linked with exposures to insecticides.(3,4,5)
- EPA estimated that as much as 75 percent of household pesticide use is inside the home and 22 percent is in yards and gardens.(6)

Pesticides are used widely in the United States, but not without some risk. Depending on the dose, pesticides may cause a range of harmful health effects and may accumulate in ecosystems. Among the health effects reported are cancer, acute and chronic injury to the nervous system, lung damage, reproductive dysfunction, and possibly dysfunction of the endocrine (hormone) and immune systems.(7,8)

Children are at greater risk of pesticide exposure than most adults. Pound for pound of body weight, children not only breathe more, eat more, and have a more rapid metabolism than adults, but also they play on the floor and lawn where pesticides are commonly applied. Children have more frequent hand-to-mouth contact as well.

Children may be exposed to pesticides in their diets, drinking water, and during activities at home, play, and school. Children may be exposed more heavily to certain pesticides because they consume a diet different than adults. For instance, children typically consume larger quantities of milk, applesauce, and orange juice per pound of body weight. This means their exposure to any pesticide residues in these foods may be higher than that of adults. Children generally are more susceptible than adults to environmental toxics because they are growing and developing. Also, their enzymatic, metabolic, and immune systems are immature, allowing in some cases for less natural protection than that of adults.(9,10)



Several hundred active ingredients, representing thousands of pesticide products, are registered with the EPA.(10) Some may cause massive acute poisoning if used improperly. Others have no obvious immediate effects, but may lead to cancer, nervous system injury, or immune system damage years or decades after exposure.(10)

POTENTIAL HEALTH EFFECTS FROM PESTICIDE EXPOSURE

The organophosphate and carbamate insecticides are commonly-used pesticides and are, therefore, a concern for children. Organophosphate insecticides work by disrupting the nervous system of insects. Unfortunately, they have a similar effect on people, pets, and wildlife. Exposure to organophosphates inhibits an important enzyme (acetylcholinesterase) found at many nerve endings. Inhibiting this cholinesterase enzyme can cause excessive nerve stimulation. Pinpoint pupils, nausea, vomiting, abdominal pain, diarrhea, profuse sweating, and muscle twitching are common symptoms after exposures to high doses of organophosphate pesticides. Respiratory paralysis and death may occur in severe cases. Repeated exposures may damage the nervous system.

Carbamate insecticides are very similar to the organophosphates, but the acute effects are usually reversible.(8,11) For this reason, carbamate insecticides often are used instead of organophosphates. Delayed adverse effects to the nervous system have not been documented with the newer carbamate chemicals.

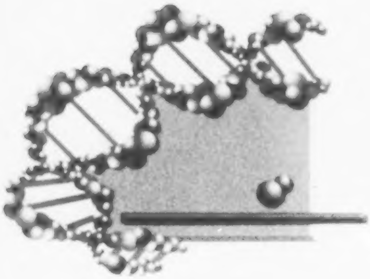
In recent years, scientists have become concerned that certain chemicals, including a few pesticides, might be disrupting the endocrine systems of humans and wildlife. Scientists also have proposed that endocrine disruption might result in cancer and harm to the reproductive system and thyroid glands.(8,12) EPA activities related to endocrine disruptors are described in Chapter 4 *Developmental and Neurological Effects*.

Pesticides may present a threat to the health of children because of their wide-spread use, high toxicity, and possible misuse by uninformed, inexperienced homeowners and professionals. Some active ingredients in pesticides have been shown to cause birth defects, cancer, and thyroid disease in rats and mice. Supposedly inert ingredients in any pesticide product may include solvents, diesel fuel, or other petroleum products that also may be toxic to exposed children.(9,10,11)

POSSIBLE ENVIRONMENTAL FACTORS

DIETARY EXPOSURES

Infants and children may be exposed to trace amounts of pesticides in food and in breast milk. EPA regulates trace amounts of pesticides, termed "residues," in food through a



system of standards called "food tolerances." A tolerance is a legal limit on the amount of pesticide in a particular food. In the past, the amount of pesticide predicted to be consumed was based on the behavior and diet of an average adult American rather than on the special susceptibility, diet, and behavior of children.(10,11) For over a decade, however, assessments of pesticide residues in the diet has included other age groups, including children under one year of age and one to six years of age. Also in the past, EPA considered the effects of each pesticide in isolation rather than recognizing that people, and especially children, often are exposed to many pesticide residues at the same time. This practice has changed in light of the requirements of the 1996 Food Quality Protection Act.

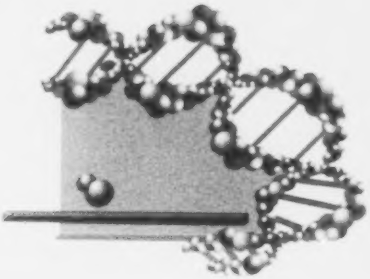
Certain agricultural chemicals, particularly herbicides, have been detected in ground water in some areas of the country.(13,14) As a result, children and others may be exposed to pesticides through their drinking water. Although insecticide use in the United States has decreased in recent years, herbicide use has increased dramatically. Certain herbicides have been associated with cancer, particularly soft tissue sarcoma and non-Hodgkin's lymphoma in animal studies. Fungicides also may be toxic, and some have been linked to cancer.(15) They are used extensively on fruits and vegetables, many of which are eaten in larger quantities by children than adults.

Each year children accidentally ingest pesticides as a result of careless storage or handling. EPA receives an average of 24,000 pesticide hotline calls each year, two-thirds of which are from parents concerned about pesticide risks to their children.

Dermal and Airborne Exposures

Pesticides are used extensively in homes, apartments, schools, daycare centers, and public buildings to control cockroaches and other pests. In the home, flea bombs, insecticide sprays, and foggers are the primary sources of exposure to children. The pesticide chlordane, banned by the EPA for termite control because of its cancer-causing potential, was used for many years in basements and around foundations of homes and other buildings. Because it persists in the environment for decades, children may remain at risk in areas where this pesticide was used.(16,17) Lawn-care pesticides also are a major source of childhood exposure. Children not only contact these pesticides while playing outside, but also track them inside.

Children living on or near farms or pesticide manufacturing facilities may be exposed to pesticides in the air. Children also may be exposed to pesticides through contaminated shoes and clothing if their parents work in agriculture or with pesticides. Occupational and household pesticide exposures of parents have been associated with increased risks for acute nonlymphoblastic leukemia in their children.(1)



Finally, children may come into contact with pesticide residues from pest treatment of school buildings and classrooms. Because of health concerns and costs, schools are trying to reduce pesticide use through new pest-control methods. The use of integrated pest management strategies, encouraged by EPA, offer alternatives to and reduction in chemical pesticide use.

Summary of EPA Activities

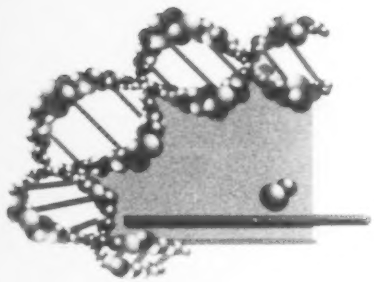
A 1993 National Academy of Sciences report *Pesticides in the Diets of Infants and Children* concluded that the scientific and regulatory approaches in effect at that time did not adequately protect infants and children from pesticide residues in food.(9) The Academy called on EPA to make significant changes: to identify pesticide exposures, analyze the potential for harmful health effects, and use these data to determine actual risks. The Academy report provided a major challenge to EPA to improve the safety of the food supply and provide greater assurance that children are protected.

EPA Administrator Carol Browner responded to the Academy report with the announcement of a national policy to consistently and explicitly take into account health risks to children and infants from environmental hazards when assessing environmental risks. In 1996, Congress passed the Food Quality Protection Act (FQPA) to provide further protection to children (See box on following page).

EPA is committed to ensuring the safety of the foods children eat by: (1) reducing the use of high-risk pesticides, (2) increasing the research and testing needed to learn more about children's exposure to pesticides in food, (3) working with the states to assure compliance with existing pesticide laws and regulations, and (4) establishing new standards to protect children and infants from dietary exposures to pesticides. EPA also is expanding its study of the effects of pesticides on the neurological, endocrine, and immune systems of children.

Strengthened Standards and Better Public Information

The Safe Drinking Water Act Amendments (SDWA) of 1996 and FQPA include measures to protect the public from harmful contaminants in water and food. Both Acts provide for special consideration of the risks to susceptible members of the population, such as children. The special protections in FQPA require EPA to characterize the potential hazards and exposure to infants and children from pesticides in their food. An extra ten-fold margin of safety must be used to account for uncertainties regarding available information on how dangerous a chemical is and how much exposure is likely, unless data exist to show that such an extra margin of safety is not necessary. EPA must reassess approximately 10,000 existing pesticide tolerances by August 2006. The Agency will address first those pesticides that pose the greatest hazards.



FQPA Reforms on Pesticides

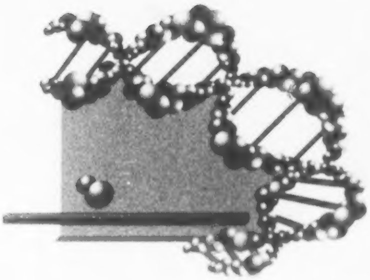
- Strengthen health-based standards to limit risks of pesticide exposure to children.
- Require an additional safety factor in setting standards to protect the health of unborns and newborns.
- Require consideration of all sources of pesticide exposure, such as diet and drinking water, and the cumulative effects of pesticide residues when determining health risks to children.
- Expand consumers' right-to-know about pesticide risks to children.

To reduce the use of the most dangerous pesticides, EPA is working with other government agencies on integrated pest management techniques. The purpose of this program is to ensure the availability of cost-effective alternatives for agricultural growers, utilities, and other groups. Toward this end, EPA is hastening the movement of safer pesticides onto the market.

EPA assesses the dietary risk to infants and children when registering and re-registering uses of pesticides on foods. The Agency is developing better methods to assess pesticide exposures. EPA also is working with the Department of Health and Human Services (HHS) and the Department of Agriculture (USDA) to design new surveys to improve knowledge of what infants and children eat. The USDA, in partnership with several state laboratories, conducts an annual survey of residues of pesticides in foods (the Pesticide Data Program, or PDP). The foods that are sampled are those most often eaten by children. The sampled pesticides are those commonly used on the foods eaten by children.

EPA, USDA, and the Food and Drug Administration (FDA) are working with the National Food Processors Association and other private sector groups to develop a National Pesticide Residue Database. This database will contain PDP and other residue data EPA will use to develop more accurate estimates of pesticide residues in food. EPA is developing methods for estimating pesticide exposures and risks from multiple sources, such as food, drinking water, and household pesticides. The Agency also has developed a new method for assessing acute exposures to pesticides.

A new Consumer Labeling Initiative will expand the amount of hazard and health information on pesticide labels, similar to the new food nutrition labels. EPA is working with the Consumer Product Safety Commission, FDA, key industry groups, parents, and health



professionals to implement this program. EPA also provides numerous publications and public-service announcements to increase public awareness of the dangers to children from careless handling and other misuses of pesticides.

Support for Integrated Pest Management

Pesticides are useful to society because of their ability to kill disease-causing organisms and control insects, weeds, and other pests. However, they need to be managed to protect people and the environment. EPA, which has the lead responsibility for regulating pesticides in the United States, supports an integrated pest management (IPM) approach. The overall goals of IPM are to minimize pesticide use, choose those pesticides that are least toxic to people and the environment, and increase the use of non-chemical approaches, such as good housekeeping and preventive maintenance. IPM has been successfully adopted by many school districts across the country.

Expanded Enforcement Efforts

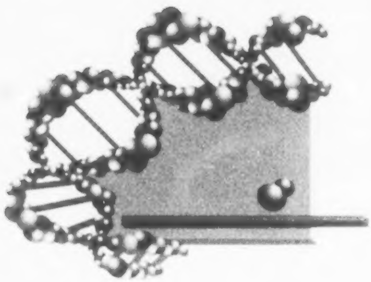
EPA and state pesticide agencies cooperate to ensure that pesticide users, manufacturers, producers, dealers, and the rest of the regulated community follow the pesticide laws and regulations. This cooperation includes issuing enforcement actions in response to violations, some of which may endanger children. For instance, EPA and several state agencies are responding to a series of incidents in urban and other residential communities involving illegal application of methyl parathion. Methyl parathion is approved only for use outdoors as an agricultural pesticide, but was used illegally in homes and businesses mainly to control cockroaches.

The Urban and Residential Pesticide Control and Enforcement Program provides guidance to state agencies to help identify, halt, and prevent the illegal use of pesticides indoors. The program also attempts to facilitate cooperation between state enforcement agencies, public health officials, and other local organizations.

Understanding Risks to Children's Health

EPA will require pesticide and chemical manufacturers to conduct new tests to assess potential toxic effects of pesticides on reproduction and development and on the immune and nervous systems. EPA has proposed updated guidelines for assessing the risks of cancer causing substances. It also recently issued guidelines for assessing potential neurotoxic effects in humans, including children.

EPA is expanding its research program on pesticides in children. Scientists are surveying children's exposures to pesticides through air, water, food, and house dust in schools, daycare facilities, and other places children may encounter pesticides. Researchers are



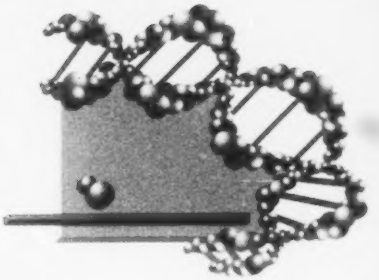
studying children's activity patterns and examining how the health effects of pesticides differ for children and adults. They are especially interested in how pesticide effects differ at critical periods of neurological and immunological development.

EPA Projects on Health Effects of Pesticides

Strengthened Standards and Better Public Information

Title:	Pesticide Re-Registration Program
Description:	Through the re-registration program, EPA is reviewing human health and environmental effects data and making re-registration eligibility decisions on all active pesticide ingredients registered before November 1, 1984. All registered pesticides must meet the new safety standards of the 1996 Food Quality Protection Act. Under this law, EPA must conclude with "reasonable certainty" that "no harm" will come to infants and children or any other individuals exposed to pesticides. Pesticide exposure from food, drinking water, home, garden, and all other sources must be considered in determining allowable levels of pesticides in food. As a result of this law, all pesticide tolerances are being reassessed as part of the re-registration program.
Contact:	Office of Prevention, Pesticides, and Toxic Substances, Carol Stangel, 703-308-8007

Title:	Pesticides: Food Safety
Description:	EPA Region 5 frequently provides information to the public regarding pesticide residues in food. This includes general information on why pesticides are needed, ways to reduce the residue remaining on fresh fruits and vegetables, pesticide-specific data, and specific food tolerances. Region 5 provides bulletins to help educate the public on food safety, particularly the FQPA provisions for infants and children.
Contact:	Region 5, John Ward, 312-886-5220



Title: Great Lakes Binational Toxics Strategy: Virtual Elimination of Persistent Toxic Substances

Description: The Great Lakes Binational Toxics Strategy targets certain persistent, toxic substances, including six banned pesticides, for elimination from the Great Lakes Basin. Although these pesticides are no longer used in the United States, they are still being released into the global environment where they may cause harm. The strategy seeks to find the remaining sources and releases affecting the basin and virtually eliminate them. The targeted pesticides are DDT, chlordane, mirex, toxaphene, and aldrin/dieldrin.

Contact: Region 5, Elizabeth LaPlante, 312-353-2694

Title: Pesticide Safety for Agricultural Workers and Their Families

Description: Under EPA's Worker Protection Standard, farm workers must receive pesticide safety training prior to working in the fields. Workers learn about the potential dangers of field-applied pesticides. Since the standard was published in 1992, EPA Region 5 has performed extensive outreach on agricultural safety and has assisted in the development and approval of education tools for states and safety trainers to relay pesticide safety messages to farm workers. Region 5 also has performed general pesticide safety outreach and offered training to rural primary health care providers.

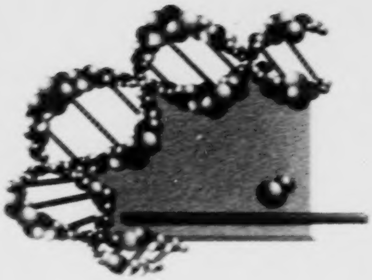
Partners: States and local health care organizations

Contact: Region 5, Don Baumgartner, 312-886-7835

Title: National Pesticide Telecommunications Network (NPTN)

Description: NPTN is a national toll-free telephone information service that provides poisoning prevention and technical information on pesticide active ingredients and product registrations in the United States. Callers receive information, such as:

- Emergency human and animal treatment
- First aid and safety tips
- State health and agricultural contacts
- Poison Control Centers
- Product labeling



- Toxicology
- Cleanup and disposal
- Regulation of pesticides
- Referrals for pesticide incident investigations and laboratory analyses
- Training in the recognition and management of pesticide poisonings

Partners: Oregon State University

Contact: Office of Prevention, Pesticides, and Toxic Substances, Frank Davido, 703-305-7576

Title: Poison Prevention

Description: Accidental poisoning from pesticide chemicals in and around the home remains a serious threat to children. EPA is an active member of the Poison Prevention Council and annually distributes thousands of fact sheets on pesticides and child safety to medical establishments and the general public. As a result of the Poison Prevention Week outreach in 1995, EPA sent a poison prevention message to 3.5 million television viewers.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Carol Stangel, 703-308-8007

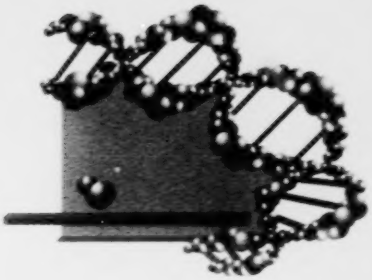
Support for Integrated Pest Management

Title: Oklahoma Ag in the Classroom Program

Description: With EPA support, the Oklahoma Department of Agriculture and Oklahoma State University have developed a curriculum for grades K-4 on pesticide management in the classroom. The program, which has been distributed to all elementary schools in Oklahoma City, emphasizes Integrated Pest Management (IPM), safe pesticide use, and food safety.

Partners: Oklahoma Department of Agriculture and Oklahoma State University Division of Agricultural Sciences and Natural Resources

Contact: Region 6, Jerry Oglesby, 214-665-7563



Title: Texas Structural Pest Control Board IPM in Schools Program

Description: The Texas Structural Pest Control Board (TSPCB) developed a pilot program to assist school districts in developing IPM policies. The TSPCB representatives visit the districts to explain regulations, provide resource materials, and review existing policies and practices. The pilot involves 16 school districts of various sizes. The goal of the program is to provide economical and effective pest control while reducing the risks posed to children's health. Utilization of IPM practices is a state legislative mandate.

Partners: Texas Structural Pest Control Board

Contact: Region 6, Jerry Oglesby, 214-665-7563

Title: Integrated Pest Management in Schools Project

Description: Through a cooperative agreement, EPA is funding the IPM Project for schools in the Monroe County Community School Corporation (MCCSC). Most MCCSC schools spray for common pests on a monthly schedule. MCCSC eliminated 90 percent of applications in three elementary schools. The cooperative agreement funds will be used to expand this program in all 18 MCCSC schools.

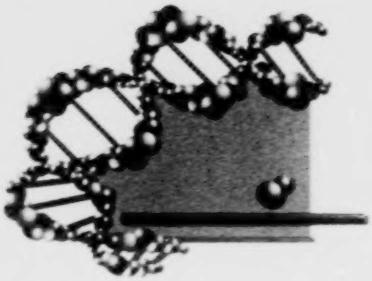
Partners: National Foundation for Integrated Pest Management

Contact: Office of Prevention, Pesticides, and Toxic Substances, Anne Leslie, 703-308-8727

Title: Sustainable Reduction of Cockroaches and Rodents in Inner-City Dwellings Using IPM Techniques

Description: This project seeks to demonstrate the effectiveness of IPM techniques to reduce or eliminate pesticide use and cockroach and rodent infestations in inner-city apartments. Simple IPM techniques that may be learned and used effectively by residents are sustainable and create a healthy indoor environment for children.

Contact: Region 2, Rachel Chaput, 212-637-4001



Title: Educational Photo Literature for Integrated Pest Management in a Low-Income Setting

Description: IPM techniques to reduce cockroach and rodent infestations in inner-city housing (currently being demonstrated in EPA Region 2) will be outlined in community-based educational literature. Each community will learn about pest infestations and their association with asthma, methods for teaching people about IPM, methods for conducting IPM, and the production of photo literature. This program is being implemented in the Hunts Point community of South Bronx, NY.

Contact: Region 2, Rachel Chaput, 212-637-4001

Title: English/Spanish Video on Integrated Pest Management Techniques to Reduce Cockroaches and Rodents in Inner-City Dwellings

Description: EPA provided funding to Rutgers University to produce English and Spanish language versions of a video on integrated pest management in the home. A disproportionately high cockroach infestation is often found in low-income, minority communities, and especially in inner-city buildings. Asthma incidence and pesticide exposure are linked with cockroach infestations.

Partners: Environmental Sciences Training Center at Rutgers University

Contact: Region 2, Rachel Chaput, 212-637-4001

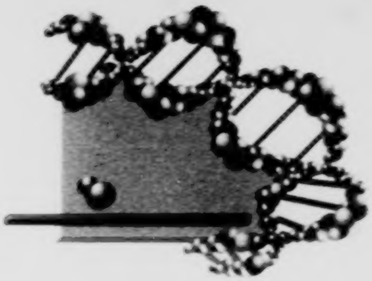
Title: New Jersey Schools and Pesticides

Description: The New Jersey Department of Environmental Protection Pesticide Control Program (NJDEP/PCP) mailed a letter and survey to all schools (over 2,000) in New Jersey to promote the use of IPM practices instead of routine chemical applications. The survey will be used to develop an IPM strategy.

Contact: Region 2, Adrian Enache, 732-321-4424

Title: Cornell University Non-Ag Sector IPM Program

Description: Cornell University started a program approximately three years ago to promote IPM in the non-agricultural sector. The program, which started



with schools, examines both interior and exterior pesticide uses. Pilot projects demonstrate IPM concepts. Outreach material is distributed to all area school districts.

Contact: Region 2, Audrey Moore, 732-906-6809

Expanded Enforcement Efforts

Title: Urban and Residential Pesticide Control and Enforcement Program—A National Initiative

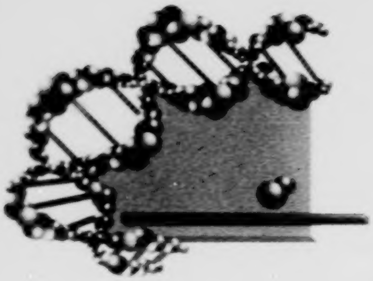
Description: This national program addresses the illegal use of highly toxic agricultural pesticides indoors in residential dwellings and commercial businesses, such as daycare centers. Comprehensive guidance is provided to state agencies for identifying, halting, and preventing the illegal diversion of agricultural pesticides into residential areas. States that receive EPA funds are asked to identify communities at risk, conduct inspections of commercial establishments with a high probability of agricultural pesticide misuse, and investigate applicators who may be misusing these pesticides. The program encourages outreach activities to educate residents concerning proper pest control and potential dangers of using bootleg pesticides. The states and EPA pursue enforcement actions when needed. EPA provides regulatory oversight as well as technical assistance to the states for investigation and enforcement actions. The national program was developed by the Office of Enforcement and Compliance Assurance in cooperation with Regions 4 and 5.

Partners: State agencies

Contact: Office of Enforcement and Compliance Assurance, Mary McDonnell, 202-564-4173 or Carl Eichenwald, 202-564-4036; Region 4, Carter Williamson, 404-562-9003; Region 5, Phyllis Reed, 312-886-6018

Title: Methyl Parathion Outreach Project

Description: Misuse of methyl parathion indoors has been reported in numerous states. EPA issued a nationwide alert to consumers through the Agency for Toxic Substances and Disease Registry (ATSDR). EPA is working with the pesticide supplier to recall all methyl parathion products, add a stenching agent to give the products an offensive odor, package all products in



containers that may be tracked by retailers, and inform the public about the dangers of misusing pesticides indoors.

Partners: ATSDR and state agencies

Contact: Office of Prevention, Pesticides, and Toxic Substances, Claire Gesalman, 703-308-3260

Title: Methyl Parathion Investigation

Description: EPA Region 5 is working with a number of state and local health and environmental agencies to determine the extent of the illegal use of the highly toxic insecticide methyl parathion in the Chicago area. The Agency is conducting community outreach and testing. Homes illegally sprayed with this pesticide are being cleaned up under a multi-agency health and safety procedure.

Partners: City of Chicago and State of Illinois

Contact: Region 5, Don de Blasio, 312-886-4360

Title: Example of Illegal Pesticide Use Case

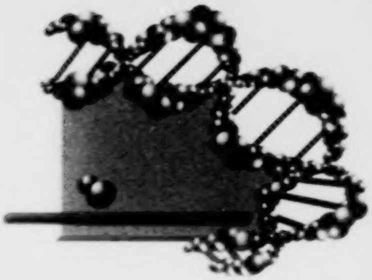
Description: A Mississippi pesticide applicator was sentenced to six and one-half years in prison on a 45-count conviction for knowingly spraying methyl parathion without a license and distributing the substance in violation of the Federal Insecticide, Fungicide, and Rodenticide Act. This is the longest consecutive imprisonment ever handed down in a case involving a strictly environmental violation. A codefendant received a similar sentence. The defendants applied the agricultural pesticide to residences and a variety of commercial facilities, including daycare centers.

Partners: Federal Bureau of Investigation and State of Mississippi

Contact: Office of Enforcement and Compliance Assurance, Martin Topper, 202-564-2564

Title: Tropical Fruits Enforcement Case

Description: Operators of an agricultural facility in Guayanilla, Puerto Rico, regularly applied pesticides, such as Malathion, Supracide-2E, Captan 50, and



Dithane F-45, to agricultural crops. These pesticides drifted or migrated into an adjacent housing complex for low-income families. Children have shown symptoms consistent with pesticide exposure, although a causal link has not been established. EPA ordered the operators of the facility to cease all pesticide applications and develop a comprehensive plan for any future application, which EPA would oversee.

Contact: Region 2, Jose Font, 212-637-6951

Title: Example of Enforcement Case in Antimicrobials Program

Description: Under federal law, public health claims of products containing pesticides cannot be made for any products distributed or sold unless the products have been approved and registered by EPA or have been granted an exemption. EPA reached an enforcement agreement with Hasbro, Inc. that prevents the manufacturer of Playskool toys from claiming that toys treated with an antibacterial pesticide protect children from infectious diseases caused by bacteria. Labels and ads for the toy suggested that the treatment protects kids from health risks, when in fact it protects only the plastic in the toy.

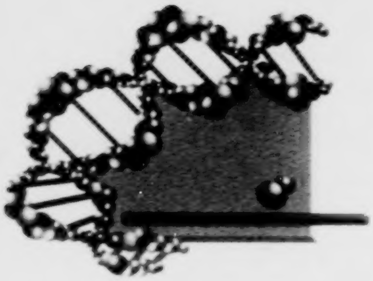
Contact: Office of Enforcement and Compliance Assurance, Mark Garvey, 202-564-4168 or Brenda Mosley, 202-564-4174

Understanding Risks to Children's Health

\Title: Dietary Exposure Models and Related Databases to Estimate Exposure to Chemical Residues

Description: The Dietary Exposure Potential Model (DEPM) provides estimates of pesticide exposure in the diet by linking food consumption with residue information. The model incorporates available information from nationwide surveys of food consumption, food intake surveys on individuals in specific demographic subgroups, and national food chemical residue measurements. EPA is modifying the model to improve its usefulness for infants and children.

Contact: Office of Research and Development, Maurice Berry, 513-569-7284



Title: National Health and Nutrition Examination Survey (NHANES)

Description: NHANES, conducted by the National Center for Health Statistics (NCHS), is designed to assess the health and nutritional status of a statistically representative sample of the U.S. population. It includes information on active and passive smoking; respiratory function tests; blood, urine, and hair sample tests for the presence of various toxic substances; and house dust tests for lead. The survey utilizes extensive questionnaires and standardized physical examinations. NCHS and EPA will collect data for the NHANES-4 version that details health, medical, and nutritional information on children.

Partners: National Center for Health Statistics

Contact: Office of Research and Development, Sue Perlin, 202-260-5877

Title: Exposure of Children to Pesticides in Yuma County, Arizona

Description: EPA will survey pesticide use by families of 300 children in low-income Hispanic communities. One hundred families will be selected and various samples taken to determine the level of pyrethroids and organophosphates in their homes. Samples will be taken from air, dust, surfaces, and children's hands to provide a comprehensive assessment of multiple pesticide exposures.

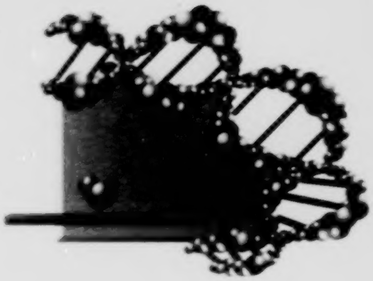
Contact: Office of Research and Development, Chris Saint, 202-260-1093

Title: Measuring and Apportioning Children's Exposure to Pesticides in Urban, Suburban, and Rural Communities

Description: The purpose of this study is to compare pesticide exposure data on children based on where they live. Researchers will measure total exposure (including all important exposure pathways to selected pesticides) for a sample of children living in inner-city, suburban, and rural neighborhoods of Minnesota and determine the relative contributions of important pesticide sources. The data will be obtained from questionnaires; skin contact measurements; and monitoring of air, water, food, house dust, outside soil, urine, and blood.

Partners: Minnesota Department of Health

Contact: Office of Research and Development, Chris Saint, 202-260-1093



Title: Pesticide Exposure of Young Children in Minnesota

Description: In collaboration with the Minnesota Department of Health, children and their households will be screened for pesticide use. The purpose is to identify children highly exposed to pesticides in an urban setting, and determine the routes and sources of exposure. The study includes a survey of residential pesticide use, information on indoor exposure (air, skin, diet), environmental concentrations (air, surfaces), biomarkers (urine), and activity patterns (questionnaire, diary, observation).

Partners: Minnesota Department of Health

Contact: Office of Research and Development, James Quackenboss, 702-798-2442

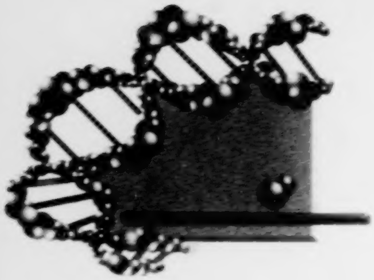
Title: Total Organophosphorus Pesticide Exposure among Children in Urban and Rural Environments

Description: This one-year study in Washington State will characterize the variability in total organophosphate pesticide exposure in children based on location, time, age, and gender. The goal is to determine the relative contributions of different environmental sources of organophosphate pesticides to the amount of pesticide in children's bodies. The study will account for all exposure pathways (diet, air, skin, house dust).

Contact: Office of Research and Development, Chris Saint, 202-260-1093

Title: Children's Exposure to Pesticides in the Agriculture Health Study (AHS)

Description: This is a study of the relationship between pesticide exposure and the rates of cancer and non-cancer diseases in 250 licensed pesticide applicators, 50 spouses, and 50 children in Iowa and North Carolina. Pesticide applicators and their families will be selected randomly within each group of interest. Pesticide exposure will be monitored using personal monitoring procedures. The results of the study will be used in characterizing pesticide exposures to families, defining cancer and non-cancer exposure-response relationships, and identifying methods to reduce the risks of pesticide poisoning.



Partners: National Cancer Institute and National Institute of Environmental Health Sciences

Contact: Office of Research and Development, David Mage, 919-541-1327

Title: Pesticides in Young Children Study in Border States

Description: Research will be conducted in Arizona, California, New Mexico, and Texas as part of the Environmental Health on the US-Mexico Border program. The study includes a review of existing environmental pesticide exposure and health data. Researchers will identify exposure indicators or biomarkers in body fluids, and screen infants and children under five years old for evidence of pesticide exposure. Children classified as subject to "high exposures" will receive more extensive monitoring.

Partners: States of Arizona, California, New Mexico, and Texas

Contact: Office of Research and Development, Brian Schumacher, 702-798-2242

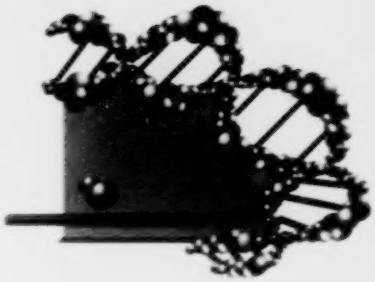
Title: The Effects of Pesticides on the Immune System and Allergic Response

Description: Researchers are examining the impact of exposure to pesticides on the development of allergies to house dust mites in adult and young animals. The hypotheses being tested are that pesticide exposure promotes development of allergic sensitization, and that this effect is greater in young than in mature rodents. Measures of allergic sensitization include immune parameters, lung inflammation, and pulmonary hyper-reactivity.

Contact: Office of Research and Development, Mary Jane Selgrade, 919-541-2657

Title: The Biochemical Effects of Pesticides on the Central Nervous System

Description: This research will determine if the adverse effects of exposure to pesticides, such as organophosphates and carbamates, in young rats during development of the central nervous system (CNS) are different from the adverse effects of exposure in adults. In the body, these pesticides block an important enzyme, acetylcholinesterase (AChE), found at many nerve endings.



Blocking the activity of this enzyme may cause excessive nerve excitement. Age-related changes in this enzyme's activity in blood and tissues and CNS development in young and adult animals will be examined.

Contact: Office of Research and Development, Stanley Barone, Jr., 919-541-3916

Title: The Effects of Pesticides on Learning and Memory

Description: This project will determine if perinatal exposure to pesticides, such as the organophosphates and carbamates, produces persistent effects on learning and memory in young animals and whether these effects are different from those produced by comparable exposure in adult animals. Also the project will study possible mechanisms for these effects, including changes in neurotransmitter levels.

Contact: Office of Research and Development, Robert MacPhail, 919-541-7833

Title: Neurochemical Changes and Behavioral Effects Induced by Pesticides

Description: Cognitive and neurotransmitter effects of pesticides on memory and learning will be compared in young and adult rodents. Immediate and long-term effects will be assessed and changes in behavioral measures will be evaluated.

Contact: Office of Research and Development, Mark Stanton, 919-541-7783

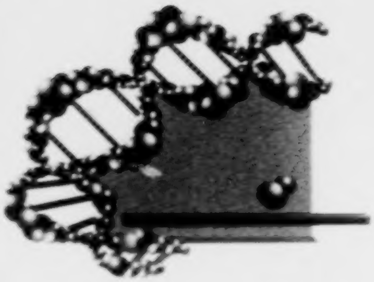
Title: Neurotoxicity of Cholinesterase-Inhibiting Pesticides

Description: The objective of this research is to determine the effects of pesticides that block acetylcholinesterase (AChE) in animals of different ages and genders. Chemical-specific effects on blood AChE levels, and toxic effects elicited by anti-AChE pesticides as a function of age and gender, are being examined in rodents.

Contact: Office of Research and Development, Stephanie Padilla, 919-541-3956

Title: Neurobehavioral Characterization of Susceptible Populations and Pesticide Neurotoxicity

Description: Researchers are comparing the behavioral and biochemical effects of



cholinesterase-inhibiting pesticides on male and female rats at ages representing those of human toddlers, preadolescents, and young adults. Researchers also will try to determine the mechanisms responsible for the observed effects and track any changes that persist or develop later in life.

Contact: Office of Research and Development, Ginger Moser, 919-541-5075

Title: Age-Related Sensitivity to Cholinesterase-Inhibiting Pesticides

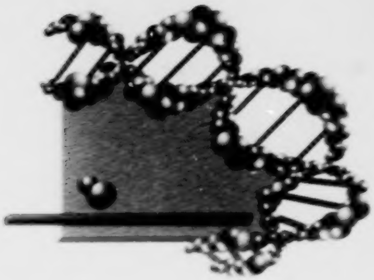
Description: Specific biological factors that may be responsible for differences in the sensitivity of young versus adult animals to cholinesterase-inhibiting pesticides will be identified. Once identified, factors contributing to the different age sensitivities will be applied to predict human toxic responses.

Contact: Office of Research and Development, Stephanie Padilla, 919-541-3956

Title: Organophosphate Insecticide Exposure from Pets Treated with Flea Control Insecticides

Description: This study will assess the amount of residues of organophosphate insecticides available for transfer to children from dogs treated for fleas with either a dip or a collar. The study will determine the potential exposure of children who play with, touch, and spend large amounts of time with pets.

Contact: Office of Research and Development, Chris Saint, 202-260-1093



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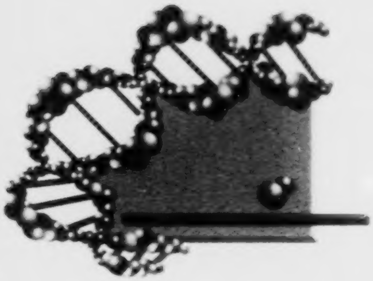

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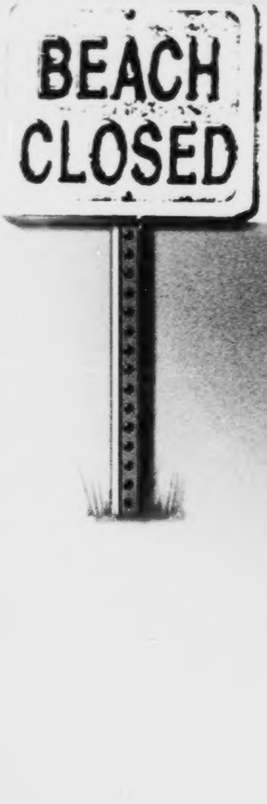
Chapter 6

Potential Risks from Contaminated Water

Potential Waterborne Risks

Children's exposure to waterborne contaminants can occur when eating contaminated fish, consuming contaminated drinking water, or swimming in contaminated oceans, lakes, or streams. Disease-causing organisms in sewage-contaminated water can result in hepatitis, dysentery, gastrointestinal illness, fever, ear infections, and other health problems. Also bodies of water and their sediments can be contaminated with toxic substances, such as polychlorinated biphenyls (PCBs) and metals like arsenic, mercury, lead, and chromium. These contaminants are thought to contribute to serious health problems, such as cancer, birth defects, nervous system damage, respiratory system disease, burns, and skin irritations.(1,2,3,4,5)

Hundreds of beaches are closed each summer because of contamination from untreated sewage and other sources. In 1995, more than 3,500 beaches in the United States posted warning signs or closed for at least one day due to bacteriological or other types of contamination. The most frequent sources of harmful microbes are fecal contamination from sewer overflows, water treatment plant malfunctions, and storm water runoff. Surface waters and their sediments also can be contaminated by toxic chemicals, such as PCBs and heavy metals.(6)



Children and women of childbearing age may be at increased risk compared to other subpopulations. Compared to adults, children are at increased risk to bacterial and viral infections because they play in the water for longer periods, tend to have more cuts and scrapes, and may accidentally swallow more water than adults. Women exposed to high levels of PCBs or mercury during pregnancy may give birth to children with delayed development and learning disabilities. Fish are an important part of a healthy diet. However, some fish caught for sport or subsistence may contain chemicals that could pose health risks if eaten too often.

Pollutants, such as PCBs and mercury that accumulate (or bioaccumulate) in increasing amounts in the tissues of fish, birds, animals, and humans, are of great concern because of the potential for high exposures. Eating fish containing certain chemical pollutants may cause birth defects, liver damage, cancer, and other serious health problems. These pollutants may pose special risks to a developing fetus, nursing infant, and young child when they or their mothers eat contaminated fish.(7)

Tap water that meets federal and state standards generally is safe to drink. However, some contaminants of potential concern are not currently regulated. Threats to drinking water quality and quantity are increasing. These emerging problems need attention and are the object of extensive federal, state, and local efforts.

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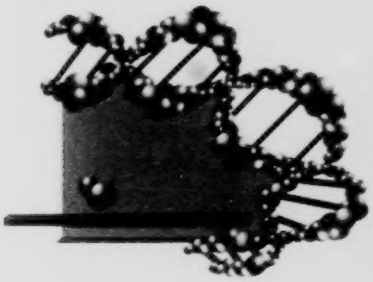
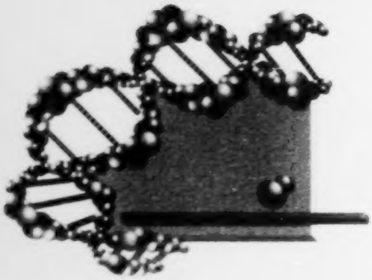


All drinking water contains some naturally occurring chemical contaminants, which are usually not harmful at low levels. Actual events of serious drinking water contamination are infrequent, and typically are not at levels posing acute health concerns. In 1994, only eight percent of community drinking water systems reported a violation of the total coliform (bacteria) standard in drinking water.(8) Generally, these standards are established based on a lifetime of exposure, therefore, one violation poses a limited health risk.

When microbiological and chemical contaminants enter water supplies, their potential effects include gastrointestinal illness, skin irritations, cancer, reproductive and developmental problems, and other health effects. Microbiological contaminants are of greater concern because they may cause immediate health threats, such as gastrointestinal illness.(9, 10) Frequently occurring microbial contaminants include the Norwalk virus, *Cryptosporidium*, and *Giardia*. The effects of contaminated drinking water are illustrated by localized outbreaks of waterborne disease. Most of these outbreaks have been linked to contamination by bacteria, protozoa, or viruses, probably from human or animal waste. For example, in 1993 and 1994, there were 30 reported disease outbreaks associated with drinking water: 23 associated with public drinking water supplies; and seven with private wells.(9, 10) In 1993, the water treatment plant in Milwaukee became ineffective during a period of heavy rainfall and storm water runoff, and hundreds of thousands of Milwaukee residents became ill from drinking water contaminated by the microbe *Cryptosporidium*. Over 4,000 persons were hospitalized, and over 50 died (some counts put deaths as high as 100).(11)

Children may be more vulnerable to certain waterborne contaminants. Because children, especially infants, drink more fluids per pound of body weight than adults, they could be more exposed to contaminants present in drinking water. Since the immune systems of very young children are not as well developed as those of adults, they may be less able than healthy adults to fight microbes in drinking water, and children have more severe effects from gastrointestinal infections. While growing, children may be susceptible to contaminants that affect the critical stages of development.

Nitrates, which are occasionally found in drinking water at concentrations above the national standard, can pose a serious threat to very young children, especially newborns. Commonly used in fertilizer and as curing agents in foods, nitrates can be converted to nitrites in the intestines of children. After entering the blood stream, nitrites block the oxygen carrying capacity of the blood, resulting in anemia or blue-baby disease. While rare, this condition can be particularly severe in infants who consume nitrate-rich water in their milk formula. An enzyme that reverses the effect of nitrites in older children and adults is not fully functional in infants.(12)



Summary of EPA Activities

EPA is protecting children from risks associated with water pollution in drinking water, surface water, and fish. EPA issues national standards and health advisories; oversees the monitoring of drinking water supplies; and supports state programs that help ensure safe beaches, clean surface water, and uncontaminated fish. EPA takes enforcement actions where there are violations of drinking water standards or wastewater discharge permits, or where a discharge is not permitted.

Contaminants in Drinking Water

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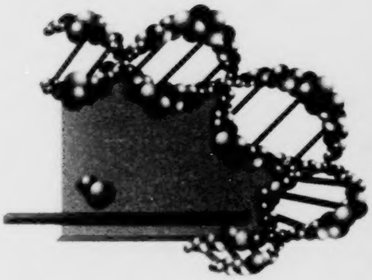
EPA is engaged in a number of activities to characterize better the occurrence, exposure, and health impacts of drinking water contaminants on a number of particularly vulnerable populations (sensitive subpopulations), including infants and young children. These activities result in better health assessments, regulations, and enforcement with respect to drinking water protections. Examples of these activities include general improvements in risk assessments that cut across all areas of the drinking water program:

- Health assessment methods: Maximum Contaminant Levels (MCLs) for drinking water are written with the goal of protecting the most sensitive subpopulations from contaminant exposure. Therefore, regardless of whether children are found to be the most sensitive subpopulation to exposure to a particular contaminant, their health is protected.
- General health research: The Safe Drinking Water Act of 1996 calls for better science and analysis of health effects to sensitive subpopulations, including children, to support the development of drinking water regulations. Extensive research to better characterize risk is underway and focuses on the health effects of chemical and microbial contaminants.
- Risk-based contaminant selection: New tools are being developed to help ensure that contaminants posing the greatest threat to public health are the first to be considered for regulation. (Determinations of greater public health risk are based on the most sensitive subpopulation.) For example, a National Contaminant Occurrence database is being developed that will store information on occurrence of drinking water contaminants and potential contaminants. This database will be used to support EPA's decisions on which contaminants to regulate in the future.

In the past, EPA has focused its drinking water regulatory activities in three areas: gastrointestinal diseases resulting from exposure to waterborne microbes, cancer, and lower intelligence quotients (IQ) in children exposed to lead in drinking water. The Surface Water Treatment Rule and the Total Coliform Rule help prevent gastrointestinal diseases



by controlling microbial pathogens in drinking water. Future regulations will target high priority chemical contaminants. Also, EPA is examining the health risk trade-off between controlling microbial pathogens, including *Cryptosporidium*, and increased risk of cancer resulting from potentially cancer causing byproducts that are formed when water disinfectants come in contact with organic matter present in water.

The Safe Drinking Water Act controls children's exposure to lead via drinking water by requiring regulated public water supplies to treat their water to reduce the water's capacity to corrode lead materials in plumbing and distribution systems.(13) Also, there are national standards for lead in various plumbing materials, houses, and the connections between the public water main and buildings where people receive their water. Lead service lines can no longer be installed, and those still in place must be tested and replaced if tap water exceeds the drinking water action level. Other lead materials, particularly lead solder, have been banned from use in water systems. Faucets must undergo performance testing to demonstrate that they do not contribute excessive concentrations of lead to the drinking water. The requirements of the Lead and Copper Rule have resulted in a significant reduction in the exposure of children to excessive lead in drinking water.(8)

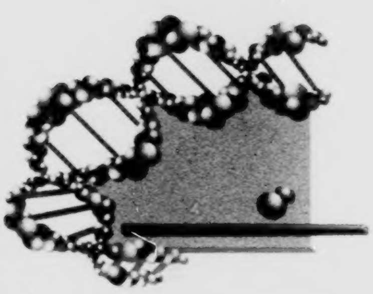
Contaminants in Surface Water

EPA's efforts to protect people from surface water contamination center around the Clean Water Act. Under the Act, any point-source discharge to a water of the United States is prohibited unless authorized by a permit. Through the permit process, EPA and the states control chemical and other discharges to surface waters. Facilities must operate, monitor, and report in compliance with their permits. EPA or delegated states enforce the provisions of the permit when violations of the limits occur.

The Beach Health Protection Program works with local officials and groups to inform the public about contamination at beaches and thus reduce children's exposure. EPA has begun to collect beach monitoring and closure information and make it available to the public. This information will be compiled in a database and included on a World Wide Web site on beach health. EPA takes legal action against municipal wastewater systems by requiring that they upgrade to eliminate or reduce overflows and malfunctions, which are major contributors to beach contamination. The Agency also is working with other federal agencies and the states to protect infants from exposure to toxic molds resulting from floods.

Contaminated Fish

EPA and state and tribal health departments are improving the effectiveness of fish consumption advisories and thus are reducing health risks to children who eat fish and to the fetuses of pregnant women who eat fish. EPA is developing new ways to determine health



risks and to assess how much fish children and women of childbearing age eat. In conjunction with the Agency for Toxic Substances and Disease Registry (ATSDR), EPA is developing materials that explain the health risks developing fetuses and children may encounter when their mothers consume contaminated fish. These materials are intended for pediatricians; state, tribal, and local health agencies; and the public. Through its regional initiatives program, EPA is working with a number of states, tribes, and Canada to reduce contamination and eliminate future pollution in the Great Lakes.

Projects on Contaminants in Water and Fish

Contaminants in Water

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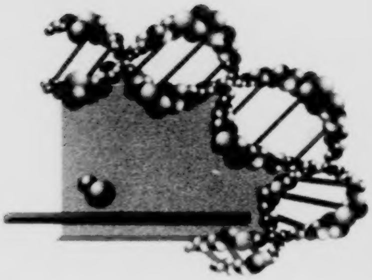
Title:	Microbial Disinfectant/Disinfection Byproducts (M-DBP) Rules:
Description:	A new set of rules currently is being developed to address the risk trade-off between controlling microbial pathogens, including *Cryptosporidium*, and potentially cancer causing byproducts formed when disinfectants come into contact with organic matter present in water. These rules are collectively known as the Microbial-Disinfectant/Disinfection Byproducts (M-DBP) Rules. The first of these, the Interim Enhanced Surface Water Treatment Rule and the Stage 1 Disinfectant/Disinfection Byproducts Rule (D/DBPR), are due to be completed in November 1998. Other rules in the M-DBP cluster are the Information Collection Rule, the Final Enhanced Surface Water Treatment Rule, and the Stage 2 D/DBPR. These standards will be set based on the most sensitive subpopulations affected by the contaminants. Children are among those sensitive subpopulations considered, and therefore will be protected by these regulations.
Contact:	Office of Water, Elizabeth Corr, 202-260-8907

Title:	Information Collection: Sensitive Subpopulations
Description:	The 1996 amendments to the Safe Drinking Water Act charge EPA to identify subpopulations (*e.g.*, infants, children, pregnant women) at greater risk than the general public to adverse health effects from exposure to contaminants in drinking water. The contaminants of interest for the Interim Enhanced Surface Water Treatment Rule are microorganisms (specifically *Cryptosporidium*, *Giardia*, and intestinal viruses) that are a potential hazard to human health. In addition, EPA has begun to collect data on individuals whose immune systems are potentially suppressed



(*e.g.*, individuals with diabetes, osteoporosis, renal disorders, AIDS, cancer, organ transplants). One project seeks to compile information on daycare facilities where children are in close physical contact with each other. In the event of a waterborne disease outbreak, infection may spread rapidly in daycare centers, especially if hand washing and diaper changing practices are inadequate.

Contact: Office of Water, Joyce M. Donohue, 202-260-1318

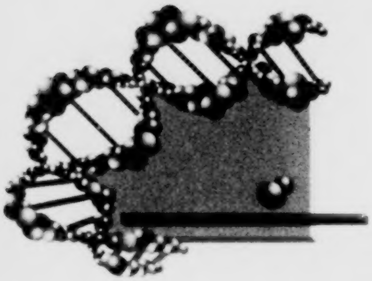
Title: Microbial Diseases: Effects of Age and Sex on Morbidity and Mortality

Description: In the regulation of disinfectants and their byproducts, there is a delicate balance between the risk associated with chemical exposure and the risk associated with exposure to waterborne pathogens. The relative risks are affected by a number of factors, including the impact of age and sex on sensitivity to microbial diseases. EPA proposes to use CDC data on morbidity and mortality from outbreaks of microbial foodborne and waterborne diseases, to evaluate the influence of age and sex on susceptibility to microbial diseases and disease mortality. Differences in apparent response for different microorganisms will be evaluated where possible. The CDC data will be supplemented by published accounts of the disease outbreaks. This study will allow EPA to document the susceptibility of children to microbial diseases and make better risk-management decisions based on improved data.

Contact: Office of Water, Joyce M. Donohue, 202-260-1318

Title: Water Consumption Estimates for Subpopulations, Including Children

Description: This study will examine whether and to what extent infants, children, pregnant women, the elderly, individuals with a history of serious illness, or other subpopulations may experience elevated health risks from contaminants in drinking water. Current drinking water intake rates for primary sources of water are based on data now 20 years old, and there is reason to believe that water consumption patterns have changed since that time. To characterize current exposure to contaminants in drinking water, EPA will generate estimates of tap and bottled water intake based on the U.S. Department of Agriculture's 1994, 1995, and 1996 Continuing Survey of Food Intake by Individuals (CSFII). Estimates will be generated based



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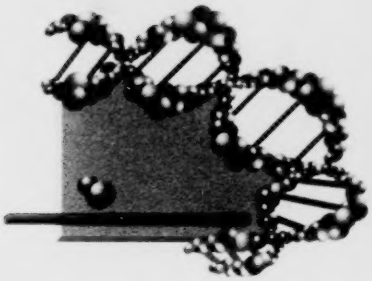
	on population demographics, such as age, gender, and geographical region. Consumption estimates for plain water consumed as a beverage and water added to foods and beverages during preparation will be determined.
Contact:	Office of Water, Helen Jacobs, 202-260-5412 or Julie Du, 202-260-7583

Title:	Monitoring Compliance with and Enforcing the Requirements of the National Drinking Water Regulations on Lead and Copper
Description:	EPA currently is evaluating compliance of public water systems with the national primary drinking water regulations for lead and copper. These regulations established monitoring and treatment requirements for public water systems. This project is designed to ensure compliance by all public water systems, thereby reducing the amount of lead children consume from drinking water. So far, several hundred enforcement actions have been taken by EPA and the states against systems that have failed to meet the initial monitoring requirements of the rule. Currently, EPA is evaluating data on whether systems have complied with the subsequent requirements in the rule (*e.g.*, installation of corrosion control, beginning of lead service replacement). EPA will be working with the states to take appropriate actions to return violators to compliance.
Partners:	State agencies
Contact:	Office of Enforcement and Compliance Assurance, Brian Maas, 202-564-6019 or Betsy Devlin, 202-564-4054

Title:	Ongoing Nitrate/Nitrite Compliance Monitoring
Description:	Primary responsibility for compliance with the national nitrate/nitrite regulations in drinking water has been delegated to most states. The regions work cooperatively with the states. EPA performs inspections and takes enforcement actions on selected systems in all regions.
Contact:	Office of Enforcement and Compliance Assurance, Betsy Devlin, 202-564-4054

Title:	Community Enteric (Intestinal) Disease Study
Description:	This project will characterize the nature and magnitude of common waterborne disease in approximately 300 families with children between



the ages of two and ten. Gastrointestinal symptoms will be recorded on a daily basis. Questionnaires and reports obtained from hospital admissions and clinical laboratories will be used to assess the health status of families. Efforts will be made to identify the microbes or other contaminants that cause diseases, using laboratory analysis of fecal and body fluid specimens, and a survey of blood characteristics. The research will allow EPA to document the susceptibility of children to microbial disease and respond appropriately.

Contact: Office of Research and Development, Rebecca Calderon, 919-966-0617

Title: Determination of Human Infective Dose and Antibody Levels for *Cryptosporidium Parvum*

Description: This project will help determine water treatment goals and drinking water standards for *Cryptosporidium* by estimating the Infective Dose 50 (the dose at which 50 percent of people can be expected to show symptoms). This value has been determined in human volunteers for one strain. Other strains are being examined.

Contact: Office of Research and Development, Walter Jakubowski, 513-569-7385

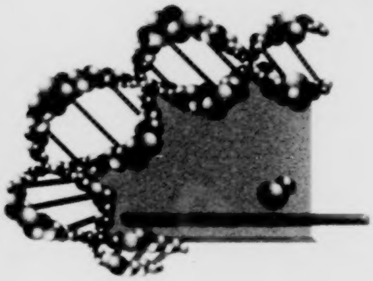
Title: Feasibility of a Cultural Method for Detecting Viable *Cryptosporidium Parvum* Oocysts in Environmental Samples

Description: This study is attempting to develop a more effective and efficient method for detecting *Cryptosporidium*, a type of microorganism that causes waterborne disease.

Contact: Office of Research and Development, Walter Jakubowski, 513-569-7385

Title: Source Water Protection Activities

Description: EPA regions are working with states using various tools to institute source water protection measures as an important part of the initiative to protect children from contaminated drinking water. Among other efforts, regions are identifying systems and sources with significant nitrate levels, which is of particular concern for infants. Regions also are piloting an education and outreach program involving small communities and tribes for whom source water protection may be the only means to protect the community



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from drinking water contamination. All of EPA's regions continue to provide technical assistance and conduct enforcement activities related to municipal and industrial wastewater treatment works.

Contact: Office of Water, Beth Hall, 202-260-5553

Title: Enforcement of Drinking Water Regulations Governing Microbial Quality of Drinking Water

Description: Enforcement of the drinking water regulations dealing with the microbiological quality of drinking water, specifically, the Surface Water Treatment Rule and Total Coliform Rule, is a high priority. Two of the most common violations in the drinking water program are violations of the total coliform monitoring/reporting requirements and violations of the total coliform Maximum Contaminant Level. While compliance with this rule has improved somewhat over the years, efforts to increase the rate of compliance must continue.

Contact: Office of Enforcement and Compliance Assurance, Brian Maas, 202-564-6019 or Betsy Devlin, 202-564-4054

Title: Flood-Related Disease in Children

Description: EPA Region 8 is working with interagency groups to identify infectious agents and mold toxins that selectively injure children. The project includes the initiative to identify mycotoxins produced by stachybottrous molds that have been linked to potentially fatal lung damage in infants. Recent studies have been conducted in Grand Forks and Fargo, North Dakota.

Partners: National Institute of Occupational Safety and Health, Centers for Disease Control and Prevention, and states

Contact: Region 8, Chris Weiss, 303-312-6671

Title: Children's Health Protection

Description: Because children are very vulnerable to beach contamination when they spend a lot of time playing near water, EPA strives to protect them and others from the risks of beach contamination. The primary contaminants of beaches are microbial organisms from fecal material in sewer overflows, storm water runoff, and water treatment malfunctions. The purpose of EPA's beach health program is to improve methods of assessing

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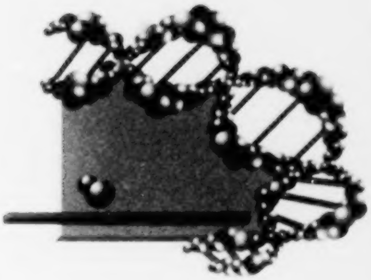


the problems, monitoring conditions, and informing the public who may be at risk. EPA has begun to collect beach monitoring and closure information and make it available to the public. This information will be compiled in a database and included on an Internet beach health home page.

Contact: Office of Water, William F. (Rick) Hoffmann, 202-260-0642

Contaminants in Fish

Title: Fish Consumption/Toxics in the Harbor Program

Description: EPA Region 3 is collecting data on fish consumption patterns in a minority community to estimate the risks to children and their families from eating the fish. The program will provide effective communication to Baltimore residents about the fish consumption advisories in the harbor, best methods for preparing and cooking fish to reduce exposure to contaminated fish tissue, and the risks from eating fish caught in the harbor.

Contact: Region 3, Reggie Harris, 215-566-2988

Title: Fish Advisories in Region 2

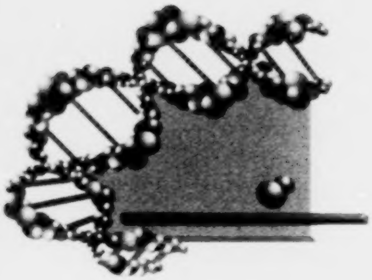
Description: EPA has been involved in public communication of fish advisories in the states of New York and New Jersey. The health advisories are targeted to particular populations at risk, including anglers who eat their catch, pregnant and nursing women, and children. Communication takes the form of flyers (some translated into other languages); public service announcements; and working with local health care providers, particularly pre-and neonatal clinics. The bodies of water most involved are the Hudson River, New York/New Jersey Harbor, Passaic River, Niagara River, and the Great Lakes.

Partners: States of New York and New Jersey

Contact: Region 2, Rachel Chaput, 212-637-4001

Title: EPA Region 4, U.S. Department of Energy (DOE), and State of South Carolina Contaminated Fish Public Involvement Campaign

Description: EPA Region 4 is working closely with DOE and South Carolina to publicize health issues associated with eating contaminated fish downstream



from the Savannah River facility. Recent research has shown that young children have been eating fish taken from waters where fish historically have been shown to have unhealthy levels of Cesium 137 and Strontium 90. The public involvement campaign provides information to local health centers and produces fact sheets and public announcements for radio and TV stations.

Contact: Region 4, Camilla Warren, 404-562-8519

Title: Columbia River Intertribal Fish Commission (CRITFC) Study

Description: EPA is in the second phase of a two-phase study to examine the role of fish consumption as an exposure route for waterborne contaminants among individuals of four Columbia River tribes, including their children. The first phase, which was completed by the Columbia River Intertribal Fish Commission, documented the types and amounts of fish eaten by tribal members. It showed that tribal children ate an average of 19.6 grams of fish per day, three times the national average of 6.5 grams. This finding is important since several studies have shown that plants and animals in the Columbia River Basin have elevated levels of harmful contaminants. Phase II of the study consists of sampling and analysis of fish species that are eaten by tribal members. Information from both phases will be used to assess the potential health impacts to children from consuming contaminants in the river.

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Partners: Columbia River Intertribal Fish Commission

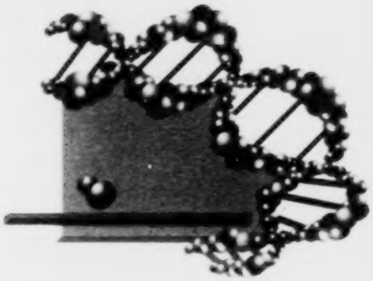
Contact: Region 10, Marcia Lagerloff, 206-553-0176

Title: Reduction/Elimination of Persistent Toxic Substances in Great Lakes

Description: EPA's Great Lakes National Program Office and Region 5 have been working with several partners to eliminate the releases of specified persistent toxic substances to the Great Lakes Basin. The strategy targets PCBs, DDT, mercury, dioxins, and certain canceled pesticides for percentage reductions within a ten-year timeframe on the path to virtual elimination of these substances.

Partners: Environment Canada, Great Lakes states, industries, tribes, environmental groups, and non-government organizations

Contact: Region 5, Elizabeth LaPlante, 312-353-2694



Title: Technical Assistance on Risk from Consumption of Contaminated Fish

Description: EPA's Fish Contamination Program (FCP) provides technical assistance to states and tribes in characterizing health risk associated with exposure to chemical contaminants in noncommercial fish and wildlife. In cooperation with the states, tribes, and other federal agencies, the FCP has developed a four-volume set of guidance documents entitled Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. This guidance includes recommended methods for protecting children and women of childbearing age from consuming fish with harmful levels of contaminants. The guidance has been distributed nationally and is used by the majority of states for issuing fish advisories, and is periodically updated to reflect new information.

Contact: Office of Water, Jeffrey Bigler, 202-260-1305

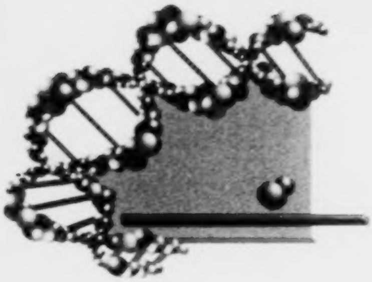
Title: Guidance on Risk from Consumption of Contaminated Fish

Description: EPA's Fish Contamination Program (FCP) is currently undertaking several projects that will include recommendations for protecting children from harmful levels of contaminants. These projects include:

- The Comparative Dietary Risk Project, which will compare health risks in people who eat chemically contaminated fish to health risks in people who do not eat fish.
- Guidance for Conducting Fish Consumption Rate Surveys.
- New toxicity values for five chemicals (DDT, DDE, chlorpyrifos, chlordane, and toxaphene) found in fish tissue and included in the FCP national guidance.
- A collaborative outreach effort with the Public Health Service.
- Guidance directed at women of childbearing age on how to reduce risks associated with the consumption of PCB-contaminated fish.

Partners: States and Tribes, Agency For Toxic Substances and Disease Registry

Contact: Office of Water, Jeffrey Bigler, 202-260-1305



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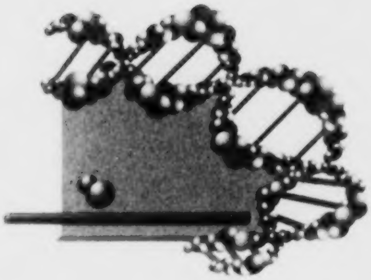

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Predicting Health Risks to Children

EPA Assesses Risk to Protect Children and Their Environment

To protect human health and the environment, EPA estimates the severity of environmental risks that could influence human populations and the environment. Risk assessment is the process of identifying and estimating the level of risk. Risk assessment is a complex, analytical process involving expertise in various disciplines, such as chemistry, biology, ecology, statistics, and medicine. EPA's risk assessment process has evolved over the years and is described in a number of reports.(1,2,3,4,5)

People often have different perceptions of risk based on their personal experiences and knowledge. Risk assessments are important because they provide a systematic, consistent way of estimating risk.

Risk assessments are used along with other factors in deciding what to do about environmental hazards. Decisions to prevent or control risk involve the participation and expertise of many different people in government, industry, and the community who have a broad understanding of the risks, laws, community, business, and feasibility of pollution control or prevention methods. Thus, risk assessments help interested parties decide how to reduce or prevent health risks by offering a common means of analyzing a complex situation.

Most EPA human health or ecological risk assessments address specific substances, such as toxic chemicals, or sites, such as a lake, river, city, industrial facility, or uncontrolled

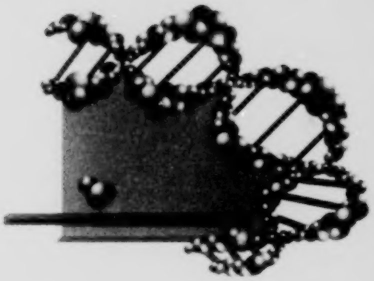
Risk Assessment Process

Step 1: **Hazard Identification:**
Determines whether exposure to a substance can cause cancer, birth defects, or other adverse health effects.

Step 2: **Dose-Response Assessment:**
Determines the possible severity of adverse health effects at different levels of exposure.

Step 3: **Exposure Assessment:**
Estimates the amount of contact individuals within a population—including potentially sensitive groups, such as children—could have with the substance.

Step 4: **Risk Characterization:**
Combines the information in the first three steps to determine the level of potential risk to humans and the environment.



hazardous waste areas. Typically, a human health risk assessment entails a four-phase process (see box on previous page) to identify the type of adverse health effects, estimate the severity of effects, determine exposure levels, and characterize the overall risk.

Some substances, such as lead, mercury, and nitrates, have prompted EPA to conduct more research and develop better risk assessment methods to protect children from exposure to such substances. In addition, EPA has begun developing new methods to account for combined exposures to a variety of substances and sources of exposure. For instance, an individual may be exposed to lead from many sources, such as contaminated drinking water, lead-based paint, and airborne lead in industrial or densely populated areas. The exposures from all of these sources could be combined into one measure for an assessment of combined risk to children.

EPA Policy Initiatives and Research Targeting Children

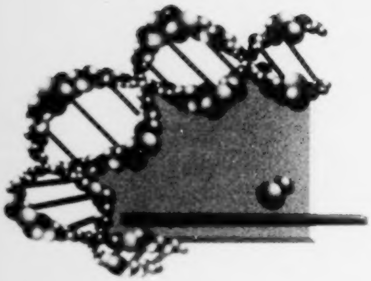
Water

EPA historically has developed national standards to protect children and adults against potential exposures to contaminants in drinking water. However, EPA is broadening the protection of children by ensuring that the developmental studies used to determine national drinking water standards are designed to evaluate lifetime effects of exposures of infants and children during their formative years. EPA also is evaluating whether children are more susceptible than adults to water contaminants. The 1996 Safe Drinking Water Act and the Food Quality Protection Act provide for additional measures to protect susceptible segments of the population, including children, from contaminants in water.

Hazardous Waste

EPA's Superfund program analyzes possible risks to children from exposure to hazardous waste sites. The analysis of risks to children between six months and six years of age accounts for exposures from soil ingestion and inhalation as well as potential risks from trespassing on abandoned hazardous waste sites. In determining risk to children, the Superfund Program modifies several factors in their calculations. Among them are body weight, inhalation rates, and ingestion rates to account for age-specific activities, such as playing in soil.

EPA and the States track the treatment, storage, and disposal of hazardous waste under the Resource Conservation and Recovery Act (RCRA). Risk assessments guide the RCRA program in correcting past pollution problems at hazardous waste facilities, as well as in setting standards for operating the facilities. The RCRA program requires an assessment of the potential risks to a child at any hazardous waste facility on which housing may someday be built. EPA also addresses potential ways that children might become exposed when evaluating chemicals being considered as hazardous waste.



In assessing potential risks to children from lead exposure, the Superfund and RCRA Programs use methods specifically developed for children to predict changes in blood lead levels. The Integrated Exposure and Uptake Biokinetic model (IEUBK) uses exposure values based on the behavior and physiology of children six years of age and under to predict future lead levels in children.

In a project to develop better tools for risk assessment, the Superfund Program in EPA's Region 9 incorporated the unique characteristics of children's activities into screening values called preliminary remediation goals (PRGs). The PRGs allow for rapid identification of potential cancer and non-cancer health risks (especially to children) from contamination at hazardous waste sites. Since they were developed, PRGs have gained widespread acceptance. They are used for screening of hazardous waste contamination and for setting cleanup priorities at Superfund sites and hazardous waste facilities.

Exposure

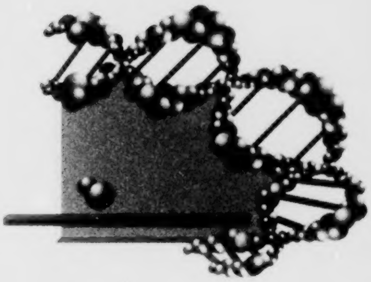
In response to the Food Quality Protection Act, the Agency has been developing analytical methods to better estimate children's exposures to pesticides in the diet and from other sources. EPA's risk assessments will address the differences in exposure levels and susceptibilities between children and adults wherever adequate data are available. EPA already has made significant progress in protecting children from lead poisoning and exposure to polychlorinated biphenyls (PCBs).

Several projects are underway to improve exposure estimates in infants and children. For instance, EPA is studying the structural differences in the airways of children and adults. The *Exposure Factors Handbook*, recently revised and reviewed by EPA's Science Advisory Board, includes exposure information by age group and provides information on childhood exposure factors. These factors include age-based exposures (such as soil ingestion), physical characteristics (such as body size), and activity patterns (such as time spent outdoors).

Cumulative Risk

The Cumulative Exposure Project is a comprehensive effort to develop estimates of pollutant exposures to children. This new initiative considers a wide range of environmental hazards, such as the combined exposure to contaminants in food, drinking water, and outdoor air. The Cumulative Exposure Project will identify pollutants that have the greatest impact on children and identify their sources. This project is consistent with EPA's 1997 *Guidance on Cumulative Risk Assessment*.(6)

Through collaboration with the World Resources Institute and the School of Public Health at the University of California, Berkeley, EPA is developing a children's environmental "health



index" as part of an overall Children's Environmental Health Indicators project. The index will be a combination of environmental health conditions for children and will evaluate both exposures and effects. The goal is to provide information for developing policies to improve environmental health conditions for children and to generate useful information for the public.

EPA is preparing a "vulnerability index" for children that will be used in the Agency's Chemical Indexing System. The Chemical Indexing System describes the relative hazard of chemical releases rather than simply ranking facilities, industries, or chemicals by the number of pounds of chemicals released into the environment each year. The vulnerability index provides a description of socioeconomic characteristics that may make children and other groups more susceptible to specific chemicals than the general population.

EPA PROJECTS TO IMPROVE RISK ASSESSMENT

WATER

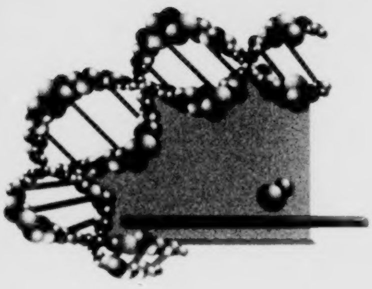
Title: Children Health Protection-Improvement in Risk Assessment Methods for Drinking Water

Description: To protect children from drinking water contaminants, EPA evaluates the potential adverse effects of contaminants on reproduction and development. The available data, usually from animal studies, are reviewed extensively to determine the potential risk from short-term and long-term exposure to contaminants on the developing fetus and children. These efforts include:

- Improvements in risk assessment to evaluate the effects of children's exposure to water contaminants.
- Application of new risk assessment methods to characterize the risk associated with these exposures and how they disrupt children's normal development into healthy adults.
- Evaluation of the mechanisms underlying children's susceptibility to water contaminants.
- Education and communication to prevent major outbreaks from water contamination.

Partners: State and local health departments, Centers for Disease Control and Prevention, and Food and Drug Administration

Contact: Office of Water, Amal M. Mahfouz, 202-260-9568 or Alan Rubin, 202-260-7589

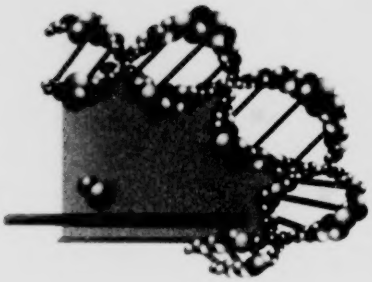


Title:	Children's Health Protection-Biosolids
Description:	Biosolids, commonly known as sewage sludge, are the remains of domestic and wastewater treatment. They may be processed and used as fertilizer or fill. In developing standards (Part 503 Regulation for the Use or Disposal of Biosolids), EPA applied a risk assessment method that offers extraordinary protection to young children, toddlers, newborns, and fetuses from potential human health impacts of arsenic, cadmium, lead, mercury, selenium, and other pollutants in biosolids. The standards for these pollutants protect not only the young and very young, but also the rest of the population.
Contact:	Office of Water, Alan Rubin, 202-260-7589

HAZARDOUS WASTE

Title:	Determining Potential Exposure of Children Near Superfund Sites
Description:	Potential cancer risks and other hazards to children from exposure to chemicals in air, water, and soil at National Priorities List sites are analyzed as a routine part of the Superfund program. These evaluations include assessing risks to children aged six months to six years who may ingest soil, evaluating risks to children through inhalation, and evaluating potential risks to children and teenagers trespassing onto abandoned hazardous waste sites (primarily 10-18 year olds). In addressing risk to children, appropriate adjustments are made to body weight, inhalation rates, and ingestion rates to account for age-specific activities. The analysis predicts changes in blood lead levels in the population. This information is used to evaluate the potential need for site cleanup.
Contact:	Region 2, Marian Olsen, 212-637-4313, Mark Maddaloni, 212-637-4315, Audrey Galizia, 212-637-4352, or Gina Ferreira, 212-637-4431

Title:	Superfund Site Evaluation
Description:	The mathematical model used to evaluate Superfund sites for possible response actions explicitly considers children as a segment of the population. Children are counted twice when exposure to contamination can occur in their schoolyards and homes. Response actions have been



taken at three large lead sites in Region 6 to address children's health. Risks to children from exposure to Superfund site contaminants are estimated using a special set of assumptions for children six years of age and younger. Baseline risk assessments have been conducted at every National Priorities List site in the Region.

Contact: Region 6, Don Williams, 214-665-2197 or John Rauscher, 214-665-8513

Title: Human Health Risk Assessments/Risk Assessment Work Plans

Description: All human health risk assessments reviewed by Region 6 for hazardous waste programs address sensitive populations, including infants and young children. The potential pathways for a child's exposure to hazardous wastes include eating, breathing, and skin contact. Risk assessments also address the potential for accumulation of hazardous constituents through the food chain, such as the breast milk pathway. The Region also addresses potential pathways for children's exposure when evaluating substances petitioned for delisting as a hazardous waste. Ten risk assessments were completed in FY 1997.

Contact: Region 6, William Gallagher, 214-665-6775

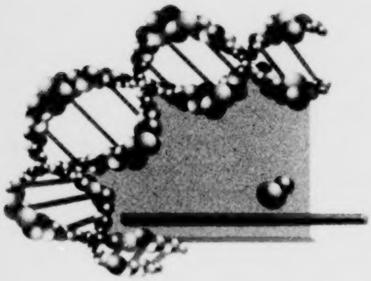
Title: Cleanup Actions

Description: Once a site is placed on the National Priorities List, the risk assessment performed for the site may take into account exposure to children as a special group that needs protection. This determination is made on a site-by-site basis depending on the potential population that may be exposed to contaminants at the site. If children are currently present at the site or are expected in the future, the risk assessment will address them specifically. Actual or potential exposure to children is a factor considered in determining the levels of risk and the appropriateness of a removal action.

Contact: Region 5, Pat Van Leeuwen, 312-886-4904

Title: Hazardous Waste

Description: An important component of the Hazardous Waste Program (RCRA Corrective Action) process is an assessment of risks to human health and



the environment at potentially contaminated properties. These assessments require inclusion of children as a distinct exposure population. For example, a quantitative risk assessment that explicitly includes children's risk is required for any facility that may contain homes in the future, even though no one currently lives on or near the property. EPA requires that assessments of children's risk include the use of Agency methods for assessing risk specifically to children (e.g., *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Children*).

Contact: Region 8, Tala Henry, 303-312-6648

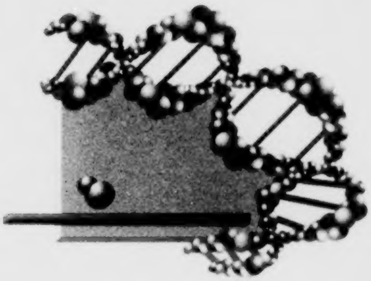
Title: Risk Assessment in Region 9

Description: Region 9 hazardous waste management programs incorporate protection of children's health into virtually all risk assessment activities. These include assessments for specific contaminants to which children are susceptible. For example, children may be very susceptible to vinyl chloride. Region 9 and EPA's Office of Research and Development have developed a new vinyl chloride risk assessment method. In its first use at the Operating Industries, Inc. Superfund site, the method helped determine safe levels of exposure to landfill gas containing vinyl chloride for children in nearby homes. Indoor air was sampled in more than 200 homes, seven of which were found to be unsafe for children because of the high vinyl chloride cancer risk. This new method is being used in four other environmental cleanup projects.

Contact: Region 9, Gerald Hiatt, 415-744-2319 or Arnold Den, 415-744-1018

Title: Preliminary Remediation Goals to Protect Children

Description: In a project to develop better tools for risk assessment, toxicologists from Region 9 incorporated the particular characteristics of children's activities into risk-based screening values called preliminary remediation goals (PRGs). The PRGs allow for rapid identification of potential health risks (especially to children) from contamination at hazardous waste sites. Since their development, Region 9 PRGs have gained widespread acceptance regionally, nationally, and internationally. They are used for risk-based screening of hazardous waste contamination and for setting priorities at hazardous waste sites. PRGs have been developed to



address both contaminants that cause cancer and those responsible for non-cancer toxicity. The non-cancer PRGs are based entirely on a childhood exposure scenario, and the PRGs for carcinogens are developed from a child-to-adult exposure scenario.

Contact: Region 9, Gerald Hiatt, 415-744-2319, Stanford Smucker, 415-744-2311, or Daniel Stralka, 415-744-2310

Title: ATSDR Implementation

Description: EPA has been involved in the Agency for Toxic Substances and Disease Registry (ATSDR) Child Health Initiative. EPA ATSDR's Board of Science Counselors in efforts to protect children at Superfund sites. EPA also is currently working with the Rush Medical Center in Cleveland in writing a chapter for the American Academy of Pediatrics *Green Book on Environmental Diseases in Children*. EPA and ATSDR are planning new projects that go beyond studying risk of specific substances to studying cumulative risks to children at Superfund sites.

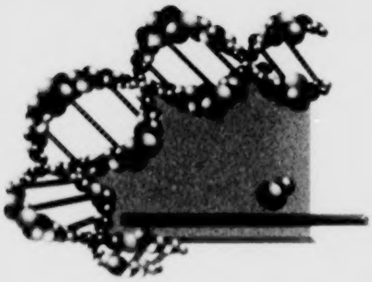
Partners: ATSDR and American Academy of Pediatrics

Contact: Office of Solid Waste and Emergency Response, Gershon Bergeisen, 703-603-8816

Title: Office of Solid Waste Risk Assessments

Description: EPA continues to include children when considering risks posed by contaminants. A new multi-pathway risk assessment (MPRA) model evaluates human and ecological risks from the disposal of more than 100 waste constituents (50 evaluated for ecological risk). The MPRA evaluates the movement of contaminants through the air, surface water, groundwater, and soil, and chemical changes that occur during this movement. Because of their small bodyweight and lifestyle, children may be more likely to encounter higher exposures per unit bodyweight than adults. In addition, children are more sensitive to certain toxics, such as lead and mercury.

Contact: Office of Solid Waste and Emergency Response, Charlotte Bertrand, 703-308-9053

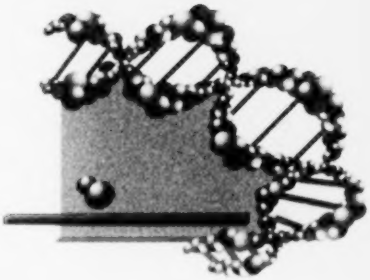


Title:	Combustion Rulemaking
Description:	EPA currently is developing regulations that will significantly reduce emissions of dioxins, furans, and mercury from hazardous waste combustion. These chemicals pose significant risk to children. When exposed, children may suffer from brain and central nervous system damage or harmful developmental effects, such as delayed walking and talking. Mercury exposure in mothers may cause developmental effects in their children. EPA is examining alternative technologies for the treatment and disposal of mercury-bearing wastes.
Contact:	Office of Solid Waste and Emergency Response, Fred Chanania, 703-308-8420

Exposure

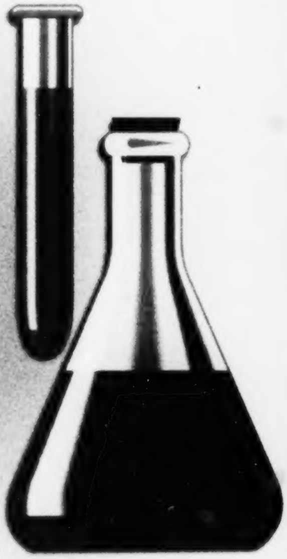
Title:	Airway Anatomical Structure
Description:	This is a study of anatomical differences between children and adults. The research uses complete airway measurements for ten generations of children ranging from infants to young adults to improve the previous estimates of airway dimensions in children. The analyses will provide estimates of changes in children's airways. This work will contribute to estimates of quantitative human health risk assessments in children.
Contact:	Office of Research and Development, Elaine Francis, 202-564-6789

Title:	*Exposure Factors Handbook*
Description:	The *Handbook* contains exposure information by age group, including children. It provides information on childhood exposure factors, including age-based exposure route data, physical characteristics, and daily activity patterns. Information is presented for factors, such as dietary intake, drinking water intake, and activity patterns.
Contact:	Office of Research and Development, Jacqueline Moya, 202-260-2385



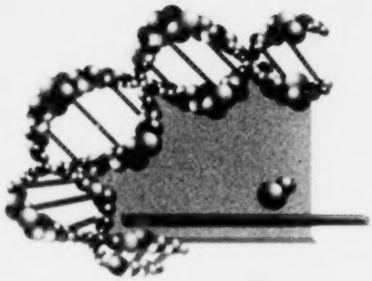
Title:	The Chester Environmental Justice Initiative
Description:	This is an assessment of the exposure pathways and sources of environmental threats faced by children in Chester, Pennsylvania. Region 3 will estimate the relative risk posed by each exposure pathway and develop measures to help ensure that children are not exposed to unacceptable health threats. Chester has a high concentration of industrial facilities (oil refineries, an incinerator, and a medical waste processing facility) that are located close to residential neighborhoods. The city has the highest infant death rate, the lowest birth rate, and the highest death rate from malignant tumors of any city in Pennsylvania.
Contact:	Region 3, Janet Viniski, 215-566-2999

Cumulative Risk



Title:	Cumulative Exposure Project
Description:	The Cumulative Exposure Project is a broad-based examination of exposure that considers cumulative exposures to pollutants through air, food, and drinking water. The methods rely on existing data to estimate occurrence of exposures across communities and for different segments of the populations. Data from the Cumulative Exposure Project will focus on identifying pollutants and sources with the greatest impacts on children. Initial analyses will focus on exposures through air and food. Levels of toxic pollutants in air, food, and drinking water will be examined to identify exposures of greatest concern.
Contact:	Office of Policy, Tracy Woodruff, 202-260-6669

Title:	Chicago Cumulative Risk Initiative (CCRI) Project
Description:	This project is designed to advance EPA's science of cumulative risk, possibly leading to a better understanding of urban industrial areas and the complexities of permitting and locating numerous incinerators and other sources in a relatively confined geographic area around Southeast Chicago and Northwest Indiana. The first phase is the development of a profile of the pollution exposures experienced by these communities based on



existing studies and data. In a second phase, Argonne National Laboratory will conduct a project to calculate cumulative risk impacts on children. The profile of pollution exposures and the resulting data will be available for use by the Agency and other interested parties to determine what activities are needed to reduce risk (*e.g.*, inspections, education and training, and pollution prevention).

Partners: States of Illinois and Indiana and local agencies

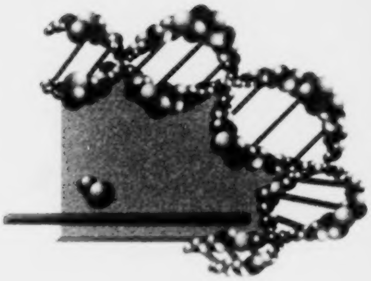
Contact: Region 5, Cheryl Newton, 312-353-6730

Title: Sixteenth Street Community Health Center

Description: The Sixteenth Street Community Health Center in Milwaukee, Wisconsin, was funded in part by EPA's Office of Environmental Justice to raise awareness of environmental hazards. Children of low-income Hispanic, Southeast Asian, and other ethnic groups living in the vicinity of the inner-city health center are of particular concern. A 1995 survey found that most residents in this area were poorly informed about health risks associated with exposure to environmental hazards. Children in these communities had elevated levels of lead in their blood but were not being routinely tested. They also had extremely high asthma rates. The project translated educational materials into the Hmong and Laotian languages and provided in-home education and health treatment, monitoring, and cleanup.

Partners: Sixteenth Street Community Health Center in Milwaukee, Wisconsin

Contact: Region 5, Linda Smith, 312-564-2602



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Chapter 8

Protecting Children Worldwide

EPA's Role as International Leader in Environmental Protection

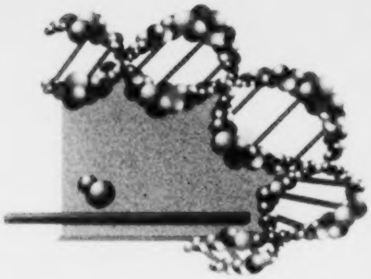
The United States plays a role in promoting children's environmental health in international organizations and other nations. The United States' goal is to foster multi-national efforts to reduce risks to children's health from global environmental hazards. EPA's leadership in building international cooperation and technical capability is an essential part of the U.S. role.

The Declaration of the Environmental Leaders of the Eight on Children's Environmental Health

The 1997 Declaration of the Environment Leaders of the Eight on Children's Environmental Health has given worldwide attention to environmental hazards that threaten children and to the need for international cooperation to improve protection of children. The Declaration was adopted unanimously by environmental leaders of the G7 countries plus Russia, known as "the Eight," at a summit hosted by Administrator Carol Browner in May 1997. Its adoption signifies the willingness of the eight most economically influential countries to collaborate on children's environmental health issues.

The Declaration, and its list of implementation actions, provides guidelines for domestic and international efforts to improve the protection of children's health. The guidelines specify concrete actions that the Eight will undertake in considering infants and children in environmental studies, risk assessments, and protection programs. Seven specific areas for international collaboration are identified:

- Improving environmental science and risk assessments by using more explicit scientific knowledge of children's characteristics.
- Reducing blood lead levels in children to below ten micrograms per deciliter and reducing child, infant, and maternal exposure to lead.
- Improving access worldwide to microbiologically-safe drinking water.
- Reducing air pollution.
- Reducing children's exposure to environmental tobacco smoke.
- Increasing and coordinating scientific research on endocrine (hormone) disrupting chemicals.
- Taking decisive international action to confront the problem of global warming.



EPA will coordinate U.S. efforts to put into action the steps called for in the Declaration and will work with other countries of the Eight. EPA also will work with the United Nations Environment Programme, United Nations Children's Fund (UNICEF), the World Health Organization, and other international organizations to further the goals of the Declaration.

EPA International Activities

EPA already supports several international initiatives that promote the goals of the 1997 Declaration. The project to promote microbiologically safe drinking water includes a water reference laboratory in the Americas and an international exchange of water monitoring data. EPA also plans to fund a scientific conference on environmental tobacco smoke and participate in international meetings on endocrine disruptors, environmental science, and risk assessments.

EPA is committed to reducing the risks to children's health from toxic chemicals in the environment on a global scale. The Agency will continue to cooperate with other federal agencies and international organizations to:

- Promote worldwide use of environmentally safe technologies and services.
- Coordinate environmental policies and implement cooperative research programs.
- Provide international technical assistance, training, and information exchange.

EPA will continue working to ensure that today's children and future generations receive the protection they deserve.

Asthma and Other Respiratory Effects

The Declaration on Children's Environmental Health highlighted the need to reduce air pollution in order to "alleviate both domestic and transboundary impacts of air quality and, particularly, children's health." Of particular concern are the effects of poor air quality on children and infants. Childhood asthma and other pediatric respiratory ailments are increasing dramatically around the world. These ailments can be exacerbated by environmental pollutants in the air, including emissions from fossil fuel combustion.

Studies in locations where air pollution is very concentrated, such as an EPA-sponsored study of children in China, provide information that will benefit children around the globe.

Achieving our national environmental goals requires cooperation with neighboring countries to reduce pollution that crosses international borders. EPA and Environment Canada provide joint leadership in efforts to better protect children from the negative effects of air pollution. The U.S.-Canada Air Quality Agreement is intended to reduce smog pollution in the Midwest and Eastern regions of the two countries. As highlighted in Chapter 2

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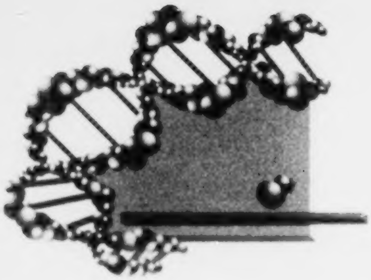


Asthma and Other Respiratory Effects, the United States has established new national ambient air quality standards for ozone and fine particulate matter.

Developmental and Neurological Toxicity

The Declaration calls for "further actions that will result in reducing blood lead levels in children to below 10 micrograms per deciliter" and commits participating nations to take action where this level is exceeded. The Declaration also highlights the need to reduce maternal exposure to lead and calls for public education on the risks to children from lead exposure.

EPA is leading worldwide efforts to reduce the use of lead in gasoline that threatens millions of children worldwide. This includes training and technical assistance in Russia, China, India, Latin America, and the Caribbean. These activities help provide countries with information on lead exposure needed to reduce children's risk. EPA has projects in Russia and Mexico to develop an inexpensive technology to screen blood lead levels in children. The Agency also is collaborating with Russia to phase out the use of lead in several industrial and commercial areas.

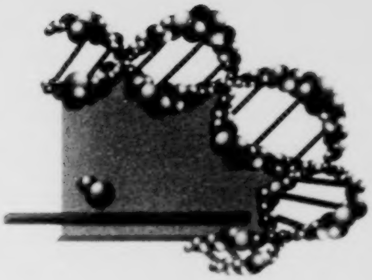
Health Effects of Pesticides

Pesticide management at the national and local levels directly affects pesticide exposures of children. EPA supports a joint project with the U.S. Agency for International Development (AID) to improve pesticide management in Central America. AID has begun regional training seminars. An in-depth analysis of Guatemala's pesticide regulatory system has been conducted, resulting in recommendations for creating an integrated pesticides regulation strategy for the country. By providing community-based programs on safe handling of pesticides, the AID-EPA project is reducing the risk of pesticide poisonings of agricultural workers and their families. Because of the large quantities of food imported from Central America, this program directly protects children in the United States.

Potential Risks from Contaminated Water

Children in undeveloped countries as well as those in the emerging democracies of Eastern Europe face much greater risks from contaminated water. This is because those nations do not provide the drinking water treatments and protections that have become commonplace in developed countries. The Declaration states, "Worldwide, the greatest threat to childhood survival is lack of access to clean water, with more than four million children dying annually from diarrheal disease associated with contaminated water."

EPA supports several initiatives throughout the world that seek to improve human health and child survival through better access to microbiologically safe drinking water. These projects



promote the protection of safe drinking water sources through watershed protection activities, good wastewater management practices, and improved community sanitation.

Under the Great Lakes Water Quality Agreement, EPA and Environment Canada review and report on discharges of toxic substances and their effects in the Great Lakes Basin. The agreement sets goals to better protect children, pregnant women, and women of childbearing age from persistent pollutants found in fish and marine mammals.

EPA International Projects

Asthma and Other Respiratory Effects

Title: Children's Lung Function Study in China

Description: This U.S.-China cooperative study in four Chinese cities will determine long-term effects on children's lung function caused by several air pollutants, including: 1) ambient acid aerosols, particulates, and sulfur oxides; and 2) indoor air pollution (coal smoke, environmental tobacco smoke). The study also examines the effects of changes in ambient pollution levels on children's lung function. Pilot study results have shown a clear association between particulate matter exposure and long-term reduction in elementary school children's lung function.

Partners: China National Environmental Protection Agency (NEPA) and Robert Wood Johnson Medical School, New Jersey, USA

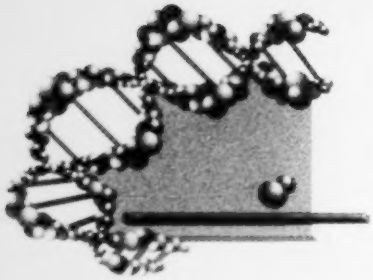
Contact: Office of International Affairs, Jentai Yang, 202-564-6429

Title: U.S.-Canada Air Quality Agreement

Description: This agreement on reducing smog pollution of the Midwest-Eastern regional airshed involves federal, provincial, and state governmental cooperation and significant public and private stakeholder involvement. EPA and Environment Canada also review, assess, and report on ground-level ozone and its effects through joint biennial progress reports.

Partners: Environment Canada

Contact: Office of International Affairs, Pete Christich, 202-564-6404

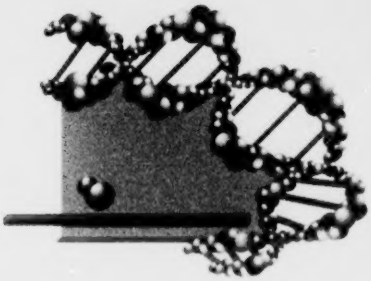


Developmental and Neurological Toxicity

Title:	Epidemiological Survey of Lead Exposure of Children in Tijuana, Mexico
Description:	An epidemiological study of blood lead concentration, lead use, and socioeconomic and demographic factors will be conducted for 1,600 children, ages two to six years old in Tijuana. The study will evaluate associations between blood lead concentration in children and potential sources of lead exposure at the neighborhood and household levels. As part of this project, a blood lead testing laboratory will be established in Tijuana. Information derived from this study will be used to establish public health priorities and to plan public health programs for lead surveillance and control in Tijuana.
Partners:	Centers for Disease Control and Prevention
Contact:	Region 9, Winona Victery, 415-744-1021

Title:	Children's Blood Lead Level Screening in Russia
Description:	This is the first study of pediatric blood lead levels in Russia. After findings of an initial survey of the City of Saratov were presented in January 1997, the United States and Russia agreed to repeat the study in other Russian cities to establish a baseline for measuring results of lead reduction activities. Data will be used to characterize the overall lead exposure problem in Russia. Three or four more cities will be studied in 1998.
Partners:	Centers for Disease Control and Prevention
Contact:	Office of International Affairs, Sylvia Correa, 202-564-6443

Title:	National Strategy for Lead Risk Reduction in Russia
Description:	A draft Russian federal strategy will be prepared to address sources of lead risk identified in 1996 by Russian experts. U.S. experts will assist in identifying effective economic mechanisms to reduce lead exposure in key sectors and incorporate lead risk reduction measures into regional economic planning, industrial restructuring schemes, and privatization guidelines.
Partners:	U.S. Agency for International Development
Contact:	Office of International Affairs, Sylvia Correa, 202-564-6443



Title: Mobile Source Training/Lead Phase-Out Training

Description: Working with international organizations, EPA has developed a training program designed to encourage the phase-out of leaded gasoline and reduce motor vehicle pollution. The course has been delivered in two Latin American countries, two Chinese cities, and the English-speaking Caribbean countries. It has been partially credited with China's subsequent commitment to phase lead out of gasoline by 2000.

Partners: World Health Organization, Pan American Health Organization, and World Bank

Contact: Office of International Affairs, Sylvia Correa, 202-564-6443

Title: Mobile Source Program in India

Description: During the next three years, EPA will assist the City of Delhi, India, to implement a program to phase out lead in gasoline and reduce motor vehicle emissions. EPA experts will provide training, technical assistance, and tools to national and municipal governments. Specific time frames are set for elimination or reduction of targeted pollutants, including lead, particulate matter, ozone, and hydrocarbons. One key benchmark will be the successful elimination of lead from gasoline in India by 2000.

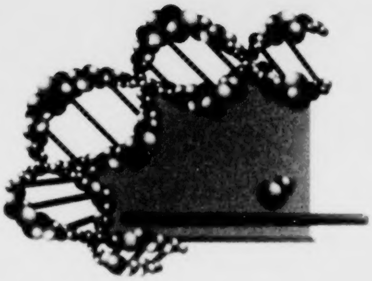
Partners: U.S. India Fund

Contact: Office of International Affairs, Jane Metcalfe, 202-564-6451

Health Effects of Pesticides

Title: Pesticides Management Project in Central America

Description: This program assists governments of Central American countries to regulate, monitor, and ensure safe use of pesticides. The national program focuses on building capacity to develop regulations for pesticide handling, storage, and use. The community-level program targets agricultural workers and public health and safety issues related to pesticide use. It focuses on using protective equipment, safe pesticide handling and application, container disposal, and avoiding pesticide contamination of drinking water.



Partners: U.S. Agency for International Development

Contact: Office of International Affairs, Paul Almeida, 202-564-6453

POTENTIAL RISKS FROM CONTAMINATED WATER

Title: U.S.-Canada Great Lakes Water Quality Agreement (GLWQA)

Description: Under this agreement, EPA and Environment Canada review, assess, and report biennially on discharges of toxic substances and their effects in the Great Lakes basin. A GLWQA Binational Strategy signed in April 1997 lists targeted persistent toxics and sets ambitious discharge reduction goals to better protect women of childbearing age, pregnant women, and children. These provisions are particularly targeted to minority cultures dependent upon family subsistence fishing and other people who depend on fish from the Great Lakes for food.

Partners: Environment Canada

Contact: Office of International Affairs, Pete Christich, 202-564-6404

Title: Microbiologically Safe-Drinking Water Laboratory Capacity in Latin America

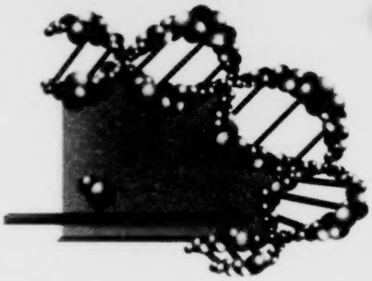
Description: EPA will provide technical assistance from its national laboratories to help convert the Pan-American Health Organization's training laboratory in Lima, Peru, to a microbiological drinking water reference laboratory serving all of Latin America. Technical expertise, technology transfer, and training will be provided to assist with monitoring programs and certifying compliance with World Health Organization drinking water quality guidelines.

Partners: World Health Organization and Pan-American Health Organization

Contact: Office of International Affairs, Martha Shimkin, 202-564-6453

Title: Municipal Water Management in Latin America

Description: This project seeks to improve human health and child survival in Latin



American and Caribbean countries through better access to microbiologically-safe drinking water. Activities include training Peace Corps volunteers on ways to improve drinking water supplies, protect watersheds, and improve community sanitation and wastewater treatment practices.

Partners: U.S. Peace Corps

Contact: Office of International Affairs, Martha Shimkin, 202-564-6453

Title: The Central American Small Community Wastewater Treatment Project

Description: This project focuses on the use of appropriate wastewater treatment technologies to reduce microbiological contamination of water used for household purposes and to ensure safer water for communities downstream.

Partners: U.S. Agency for International Development

Contact: Office of International Affairs, Paul Almeida, 202-564-6402

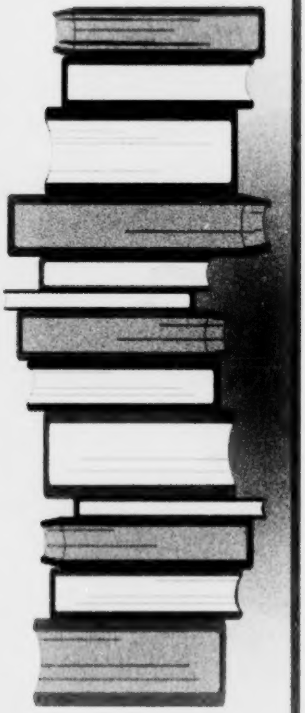
Title: Semen Quality in 18 Year Olds and Air Pollution in Czech Republic

Description: This project is evaluating semen quality in 18 year olds and air pollution levels in two districts of the Czech Republic: (1) Teplice, with high levels of air pollution, and (2) Prachatice, with low levels. The air pollution levels during the winter months in Teplice may reach extremely high levels. Data were collected on men who took physical examinations prior to joining the military. Sampling was conducted in early spring after three months of high exposure, or in the fall after the relatively cleaner summer months. Each man was interviewed, given a physical examination, and asked to provide a semen sample. The results from the first phase of the study revealed significant air pollution effects on sperm, including changes in cell structure and mobility. A second phase has begun to study these relationships in more depth.

Partners: Brno Veterinary Research Institute; Institute of Hygiene, Brno; South Dakota State University; and University of North Carolina

Contact: Office of Research and Development, Sally Perreault Darney, 919-541-3826 or Sherry G. Selevan, 202-260-2604

Environmental Education Related to Children's Health



Purposes of Environmental Education

As part of the National Agenda to Protect Children's Health from Environmental Threats, EPA is working with health and environmental professionals to identify, prevent, and reduce environmental health threats to children. Environmental education increases public awareness and knowledge about environmental issues, and provides children, parents, and communities with skills they need to make informed decisions. With education and improved access to information, parents and community leaders can better understand complex issues and find creative ways to improve the protection of children's health.

Congress recognized the importance of working with educators, parents, and children when it passed the National Environmental Education Act in 1990. This Act authorizes grants to non-profit organizations and institutions. EPA awards $3 million annually to support approximately 250 grants for environmental education projects. The majority of grants are for small, local-level projects costing $5,000 or less. Current funding priorities include projects that educate the public about human health problems caused by environmental pollution, programs that educate young people, and teacher training.

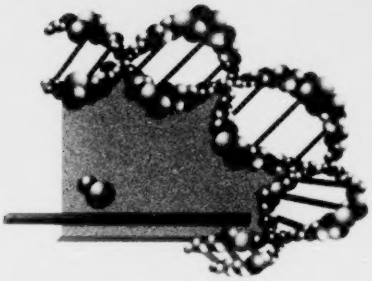
A number of EPA's public information activities are described throughout previous chapters, and additional resources, publications, and Internet sites are listed in Chapter 11. This section focuses on environmental education projects supported by EPA that help teach children, parents, and educators about the environment. The projects encourage students to become involved in community pollution prevention activities, and they often lead to removal of environmental hazards in homes, schools, and communities.

How Environmental Education Addresses Children's Health Issues

EPA environmental education programs seek to empower Americans to make better environmental decisions and participate in setting local and national priorities. The Agency is working to inspire a sense of personal responsibility for the care of the environment through relationships with environmental educators, students, media, non-profit institutions, the private sector, and state and local governments.

Educating Children

EPA believes that an environmentally-educated population starts with children. Environmental education programs teach children about environmental health issues of interest to them and their families, schools, and communities. Children learn about the effects of air and water pollution. They learn about the importance of conserving resources for the



future through pollution prevention, waste reduction, and recycling. Young people who learn about environmental issues may want to participate in community environmental programs and may influence their elders.

Educating Parents and Teachers

Environmental education programs provide knowledge that parents, educators, and community leaders can use in simple, everyday ways to protect children from environmental hazards at home, at school, and at play. EPA has worked to educate parents and teachers about potential environmental risks and how to avoid them. For instance, a number of consumer information kits have been produced to help prevent exposures to pesticides, lead, radon, environmental tobacco smoke, and other indoor air contaminants. The Agency provides a focus on environmental justice issues through a special program of grants for ethnically diverse and disadvantaged populations.

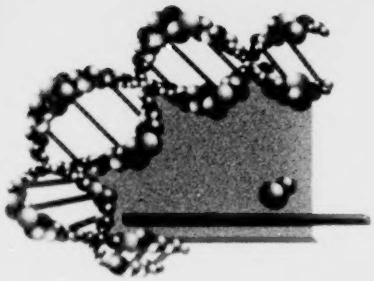
Sample EPA Education Programs Targeted to Poor and Disadvantaged Communities

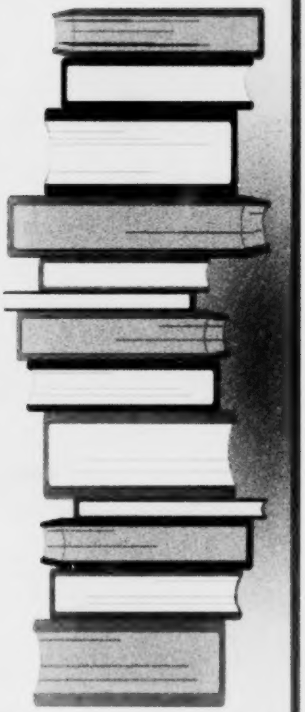
- The New Orleans Environmental Justice Education Teacher Training Program addresses environmental health threats in the New Orleans area, especially those affecting children. The Teacher Training Program focuses on environmental justice issues related to lead, air pollution, asthma, pesticides, landfills, and abandoned urban industrial sites.
- The Youth Star environmental justice project in Revere, Massachusetts, provides hands-on learning and encourages students to take an active role in environmental issues in their community. The project trains students in disadvantaged and ethnically-diverse communities on environmental health and community conservation work.

Summary of EPA Activities

EPA supports quality environmental education programs by awarding grants to schools, states, and non-profit organizations to help them improve educational programs. Special emphasis is placed on developing interdisciplinary programs and training teachers and other education professionals.

Human health, and especially children's health, is one of seven priorities for this year's Environmental Education Grant Program. The program awards grants for environmental education projects that enhance the public's ability to make responsible decisions affecting





the quality of our environment. Colleges and universities, local and tribal education agencies, state education and environmental agencies, non-profit organizations, and noncommercial educational broadcasting stations may apply for funds under the program. These environmental education projects reach teachers and students as well as the general public.

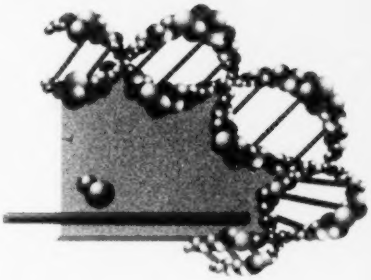
EPA encourages partnerships between the public and private sectors as a way to make the most of scarce funds and help the environmental education community ensure quality programs. The Global Rivers Environmental Education Network (GREEN) Leadership Initiative, for example, is sponsored by an array of partners including major corporations, government agencies, and environmental groups that support local efforts to address water quality problems.

Under a cooperative agreement with the National Parent Teachers Association (NPTA), a partnership has been formed to support the participation of local PTAs in the environmental management of homes, schools, communities, and ecosystems. PTA officials have been trained as environmental leaders on topics such as air pollution, environmental tobacco smoke, hazardous materials, emergency planning, indoor air quality, lead poisoning, pesticides, radon, solid waste, water pollution, and drinking water quality. NPTA has developed an environmental mini-grant program to support the involvement of state PTAs in environmental projects and programs. See Chapter 2 for more information on the NPTA's activities.

EPA also is building stronger partnerships with other governmental organizations and the private sector to improve public understanding of the role of science in environmental decision making. Through the National Enforcement Training Institute (NETI), EPA delivers courses on methods of preventing, investigating, and resolving violations of environmental laws.

EPA is committed to supporting the development of quality education opportunities for all citizens. The Agency expects to reach six million people—one-third of them under the age of 18—with a series of segments on the Public Broadcasting Service's popular *Newton's Apple* television show. The impact of the series will be heightened through an outreach effort, including lessons in the *Newton's Apple Teacher's Guide* and a special feature on the Newton's Apple World Wide Web site.

The principles of Environmental Justice—that all people must have the opportunity to live in a healthy environment and that environmental laws apply without discrimination based on race, ethnicity, culture, or economic status—guide EPA's efforts to promote increased and improved access to education programs for the poor, immigrants, and ethnic and racial minorities.



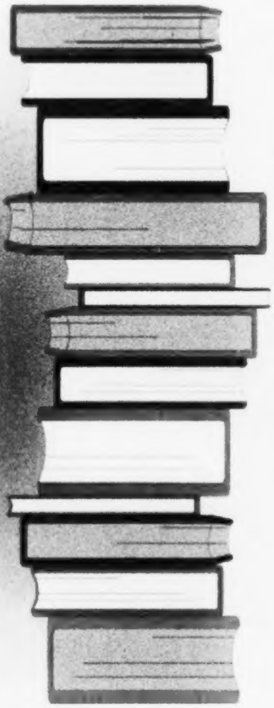
EPA Environmental Education Projects

Title: Newton's Apple "Environmental Impacts on Children's Health"

Description: "Environmental Impacts on Children's Health" will be a series of three short video segments on the Public Broadcasting System's *Newton's Apple* television show, the most frequently viewed science program in middle school classrooms. It is broadcast on approximately 300 stations across the nation. The video segments educate viewers about environmental health threats and strategies for minimizing children's exposure. The project includes lessons in the *Newton's Apple Teacher's Guide* and a special feature on the Newton's Apple World Wide Web site.

Partners: Twin Cities Public Television, Inc., KTCA-TV

Contact: Office of Communications, Education, and Media Relations, Diane Berger, 202-260-8747

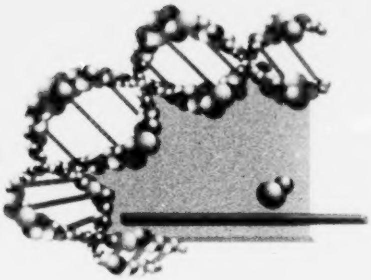


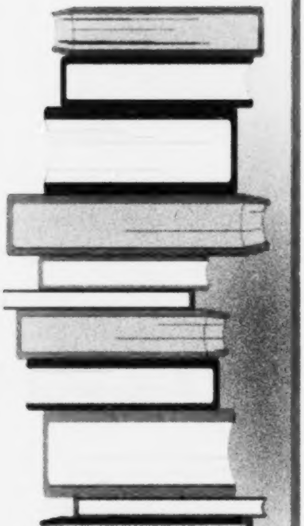
Title: The GREEN Leadership Initiative

Description: The Global Rivers Environmental Education Network (GREEN) uses an interdisciplinary education course that addresses water quality and its effect on human health. A diverse audience of more than 100 educators, 10,000 students, and 100 community leaders in ten communities will be targeted for training sessions to improve environmental education skills and learn about watershed and health issues within their own communities.

Partners: General Motors Corporation, Owens Corning Corporation, George Gund Foundation, National Fish and Wildlife Federation, National Science Foundation, Budd/Deschutes Project GREEN (Washington State), Friends of the Rouge (Michigan), Rivers Project of Lee County Schools (Florida), Project del Rio (Texas and New Mexico), Project WET, Susquehanna River Basin Project (New York), and World Resources Institute

Contact: Office of Communications, Education, and Media Relations, Diane Berger, 202-260-8747





Title: New Orleans Environmental Justice Education Teacher Training Program

Description: The Environmental Justice Education Teacher Training Program provides an integrated curriculum with modules on issues affecting children's environmental health in New Orleans. Topics include lead, air pollution and asthma, pesticides, landfills, and brownfields. The project will implement a curriculum that emphasizes environmental justice concerns, train K-6 teachers on its use, and disseminate environmental justice education materials to schools in the New Orleans area.

Partners: The Deep South Center for Environmental Justice, New Orleans Public Schools, and National Lead Information Center

Contact: Office of Communications, Education, and Media Relations, Diane Berger, 202-260-8747

Title: Pollution Prevention Education Toolbox

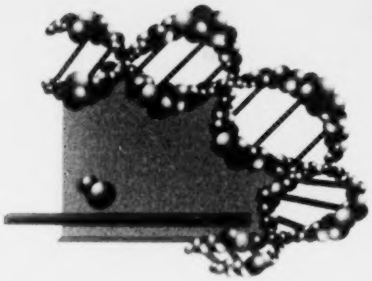
Description: The Pollution Prevention Education Toolbox contains lesson plans and educational activities related to water pollution prevention and conservation, energy conservation, general pollution prevention, waste reduction, pesticide reduction, and household hazardous waste reduction. Lessons include changing what you use, changing what you do, improving housekeeping, and educating yourself and others. Workshops for middle school teachers from the Chicago Public Schools were conducted in summer 1997.

Partners: Chicago Public Schools

Contact: Region 5, Dolly Tong, 312-886-1019

Title: Environmental Education Grants

Description: Grants awarded by EPA's Region 2 related to children's environmental health include a childhood lead poisoning prevention program for Patterson, New Jersey, and an indoor air pollution project for the St. Regis Mohawk Tribe. EPA has awarded grants worth approximately $11 million to educational organizations in all 50 states and the District of Columbia. Most grants are for $5,000 or less.



Partners: Nearly 1,000 grantees including schools and universities; state, local, and tribal government agencies; and non-profit organizations

Contact: Region 2, Terry Ippolito, 212-637-3671

Title: Give Water a Hand

Description: This camp educates high school students about water and the environment. The goal of this grant is to improve citizen involvement and partnerships to promote clean water.

Contact: Region 6, Karen Bick, 214-665-7539

Title: River Revitalization Program

Description: EPA will support the development of river revitalization projects that directly involve Boston's youth in community environmental issues.

Partners: Boston Urban Resource Partnership and Massachusetts Riverways Program

Contact: Region 1, Angela Bonarrito, 617-565-2501

Title: Youth Star Program

Description: EPA is assisting the Youth Star environmental justice project through a grant to train students in environmental education, environmental health issues, and community conservation work in Revere, Massachusetts.

Partners: Youth Star Program

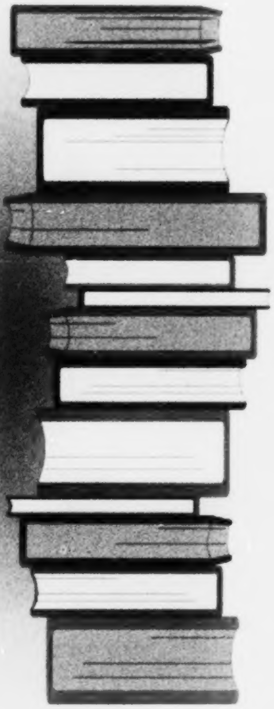
Contact: Region 1, Angela Bonarrito, 617-565-2501

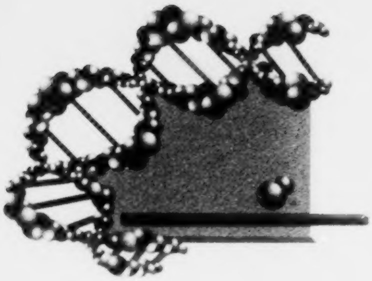
Title: Teacher Training Program

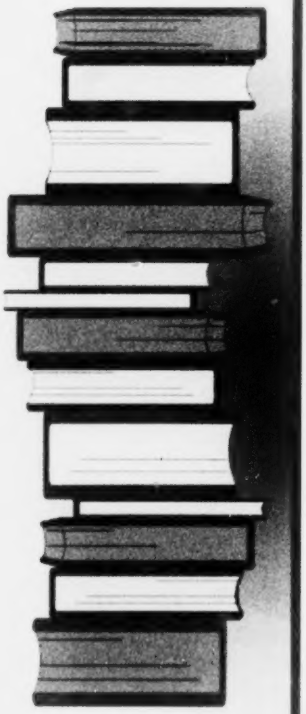
Description: This project provides hands-on training and curriculum materials to 20 elementary school teachers to cultivate a natural vegetable and herb garden with students on their school grounds. Children in participating schools will learn about pollution prevention concepts and techniques related to water, soils, and non-polluting alternatives to pesticides and herbicides.

Partners: University of Rhode Island Cooperative Extension Education Center

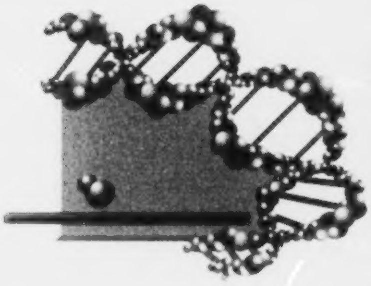
Contact: Region 1, Angela Bonarrito, 617-565-2501







Title:	Teacher Training Workshops
Description:	EPA's regional office in New England periodically co-sponsors teacher training workshops on indoor pollutants, air quality, wetlands, and other environmental topics.
Contact:	Region 1, Maria Pirie, 617-565-9447
Title:	Youth and the Environment
Description:	Students in the New England states work at summer jobs at a wastewater treatment plant or a zoo and participate in weekly field trips and seminars on topics ranging from wastewater management to restoration ecology. During the summer of 1996, 70 inner-city students were introduced to environmental careers. Sixty disadvantaged students participated in the program during 1997.
Contact:	Region 1, Charles Conway, 617-565-3517
Title:	That Magnificent Groundwater Connection
Description:	This is a resource package for teachers with stories, experiments, and songs to teach children about water. Children learn about water's cyclical movement through the environment; the connections between water and the streams, lakes, estuaries, and wetlands near their homes; where drinking water comes from; and how to be better environmental stewards. The K-6 curriculum has been distributed to teacher organizations in New England.
Contact:	Region 1, MaryJo Fuerbach, 617-565-4721
Title:	A World in Our Backyard/Adopt-a-Wetland Program
Description:	This two-part, hands-on project for middle school and high school students includes an educational curriculum with videos and a teacher's guide with activities. The "Adopt a Wetland" program teaches children about wetland ecology by helping them protect an area in their own community through stewardship activities conducted with their classes.
Contact:	Region 1, Stafford Madison, 617-565-4868

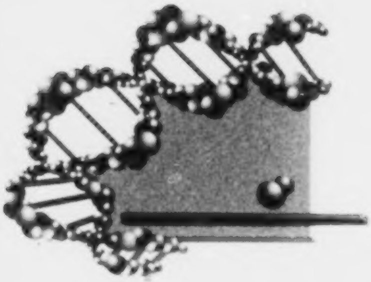


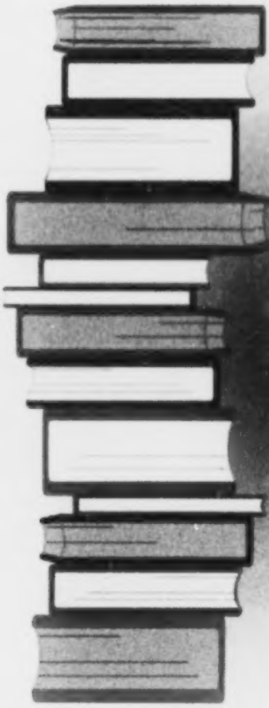
Title:	Junior Environmental Training (JET) Program
Description:	Groups of EPA staff volunteers perform skits on hazardous waste and recycling at schools, daycare centers, and environmental events in New England. Hundreds of students in grades K-8 have attended and participated in these skits.
Contact:	Region 1, Maria Pirie, 617-565-9447

Title:	Save the Sound
Description:	One hundred upper-elementary school teachers from communities within the Long Island Sound watershed will be trained on preservation and restoration of the Sound. They also will incorporate information on the Sound into their curricula. Teachers at five locations within the watershed will receive hands-on training about the Sound, its watershed, and water quality.
Partners:	Save the Sound, Inc. and University of Connecticut
Contact:	Region 1, Maria Pirie, 617-565-9447

Title:	Appalachian Mountain Club
Description:	This community-based conservation project teaches outreach and advocacy skills through the process of planning, promoting, and implementing a neighborhood environmental service project in the disadvantaged and culturally diverse community of Chelsea, Massachusetts. The project provides training to enable youth to pursue employment in the environmental and recreational fields and also helps young people create a community base for maintaining local parks and green spaces.
Partners:	City of Chelsea, Massachusetts
Contact:	Region 1, Maria Pirie, 617-565-9447

Title:	Harvard Human Health and the Environment Project
Description:	This hands-on educational program brings high quality instruction about human health and the environment to inner-city school children. By sharing technical expertise with teachers and students, the project will increase awareness of the environment and its effects on health among fifth grade public school students.





Partners: Harvard University School of Public Health

Contact: Region 1, Maria Pirie, 617-565-9447

Title: E.N. Rogers Environmental School

Description: This project educates teachers, students, and the public about human health problems caused by pollution. The E.N. Rogers Environmental School will use an environmental curriculum that will allow students to: (1) correlate the effects of water quality on an urban river; (2) collaborate via the Internet with students from Great Britain on historical comparative research; and (3) develop critical thinking, problem solving, decision making, and laboratory skills.

Partners: Lowell Public Schools, in collaboration with several partners

Contact: Region 1, Maria Pirie, 617-565-9447

Title: The Connections Project

Description: This project will complete the "Taunton River Watershed Connections Curriculum" and teacher resource kit for grades 6-12. The project will provide a model for watershed pollution prevention to schools and local communities. The Connections Project team of scientists and educators will finalize the curriculum. Workshops will provide training on the curriculum for teachers throughout the Taunton River watershed.

Partners: University of Massachusetts Extension Service

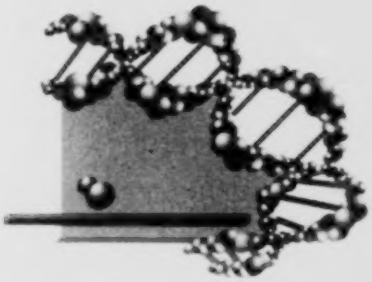
Contact: Region 1, Maria Pirie, 617-565-9447

Title: Teacher Training on Integrated Pest Management and Pesticides

Description: New Hampshire's state association of Future Farmers of America will educate high school teachers about integrated pest management (IPM) and pesticides in the environment. An initial workshop for 30 teachers will show them how to integrate instructional materials on pesticides and IPM into existing curricula. Teachers will receive further assistance through follow-up visits that will gauge additional teacher and student needs.

Partners: Granite State Association of Future Farmers of America

Contact: Region 1, Maria Pirie, 617-565-9447



Title: Active Watershed Education (AWEsome!) Program

Description: The Active Watershed Education (AWEsome!) curriculum provides future stewards of the Narrow River and Saugatucket River watersheds with the skills needed to make informed decisions about local environmental issues. The program will revise existing watershed-specific curriculum guides and train 20 upper-elementary and middle school teachers to use the curriculum. The project assists teachers and their students in assessing local environmental issues and conducting student-driven community action projects related to these issues.

Partners: Southern Rhode Island Conservation District

Contact: Region 1, Maria Pirie, 617-565-9447

Title: Water Quality Information Sharing Program

Description: Teachers and students from Rhode Island and Columbia, South America, learn about water quality, perform water quality monitoring, and share information. Seven teachers and 240 6th to 10th grade students from Rhode Island and three teachers with 120 students from Columbia participated in the 1996-97 school-year program by monitoring and working to preserve a river near their respective schools.

Partners: Rhode Island Zoological Society Roger Williams Park Zoo

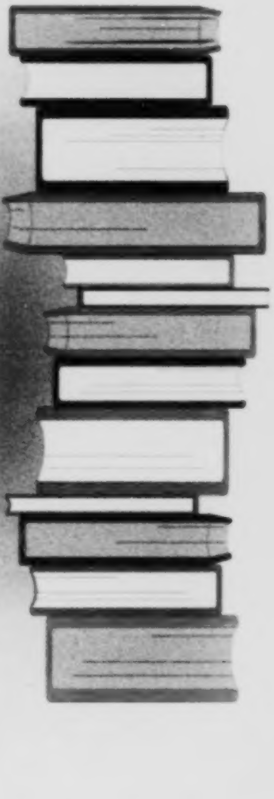
Contact: Region 1, Maria Pirie, 617-565-9447

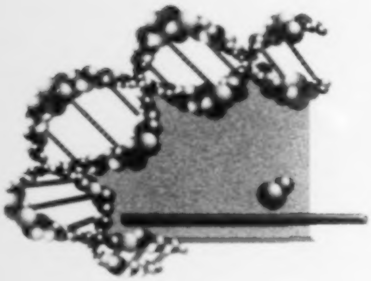
Title: Aquatic Education Exhibit

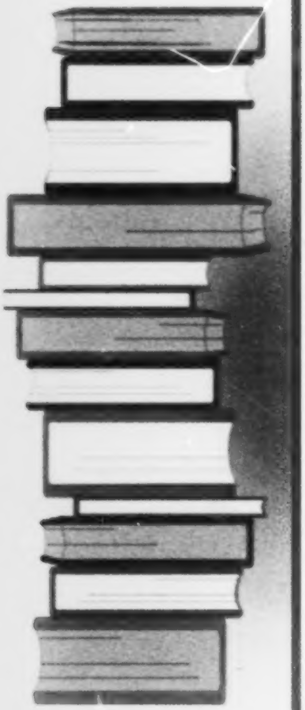
Description: Region 6 awarded a grant to the Jasmine Moran Children's Museum in Seminole, Oklahoma, to refurbish an aquatic education exhibit that will use hands-on scientific methods to teach about water pollution problems. Large tanks filled with water, fish, and plants show the effect of a polluted environment and how "bad water" can be turned into "good water." Forty thousand students are expected to visit annually.

Partners: Jasmine Moran Children's Museum

Contact: Region 6, Joe Taylor, 214-665-2200







Title: Environmental Awareness and Testing Program

Description: Region 6 awarded a grant to the Zachary Historical Association for an "Environmental Awareness and Testing" program that will involve approximately 1,000 students, including children with disabilities. The students will learn environmental research and monitoring techniques through hands-on experiences at this unique facility.

Partners: Zachary Historical Association

Contact: Region 6, Joe Taylor, 214-665-2200

Title: Philadelphia Public Environmental Education Center

Description: A Public Environmental Education Center in downtown Philadelphia educates the public about dangers to health posed by various environmental hazards. The center regularly hosts groups of school children, distributes publications, and operates a toll-free customer service hotline.

Contact: Region 3, Rene Henry, 215-566-5560

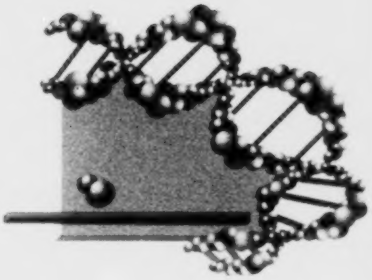
Chapter 10

Enhanced Community Right-to-Know

Improving Public Access to Information Needed to Protect Children's Health

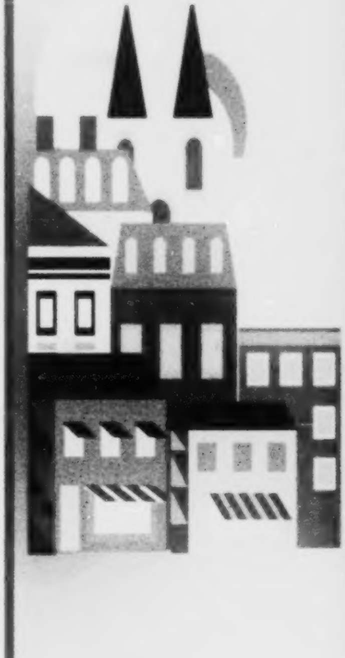
EPA is rapidly expanding the public's right-to-know about environmental pollutants in their community. Families and communities need the information to make informed decisions about how to protect children from the potential health risks posed by pollutants released in their neighborhood. In keeping with community right-to-know principles in the Emergency Planning and Community Right-to-Know Act (EPCRA), EPA has expanded public access to Agency information on pollution, particularly through the Internet. Parents can use this information to help prevent pollution in their neighborhoods and protect the health of the community's children. EPA initiatives that improve public access to information on pollution include:

- In 1993, EPA nearly doubled the chemicals on which industry must provide information about toxic releases. Over 600 chemicals are now included in EPA's Toxic Release Inventory (TRI).
- In 1996, EPA expanded the categories of industrial facilities required to disclose information about toxic releases by 30 percent, bringing the total to more than 31,000 facilities that must report their toxic emissions to the public.
- The 1996 Amendments to the Safe Drinking Water Act require water suppliers to provide consumer confidence reports to their customers, including information on local water quality, sources of drinking water, drinking water contaminants, and health risks posed by local water (see chapter 6).
- The 1996 Food Quality Protection Act includes special right-to-know provisions that provide more public information about risks from pesticides on foods (see Chapter 5).
- To protect children from lead-based paint poisoning, EPA and the Department of Housing and Urban Development recently required sellers and landlords of pre-1978 housing to disclose any known lead-based paint to home buyers, allowing potential buyers the option of conducting a lead hazard assessment (see Chapter 4).
- EPA and other federal agencies, in cooperation with medical organizations, meteorologists, and educators, have created a new federal Ultraviolet (UV) Index program to provide information needed to protect children from overexposure to harmful ultraviolet light (see Chapter 3).
- EPA has developed a national listing of *Fish Consumption Advisories* that makes information about state-issued fish consumption advisories more accessible to the public (see Chapter 11).



- In 1997, EPA began collecting beach monitoring and closure information and making it available to the public. Eventually, the information will be compiled in a database and included with other information on a World Wide Web site on beach health (see Chapter 6).
- EPA has produced a number of consumer information kits on preventing exposures to lead, radon, other indoor air contaminants, and pesticides in neighborhood homes and schools (see Chapter 2).
- EPA recently began a Consumer Labeling Initiative to expand the amount of hazard and health information on household consumer and pesticide product labels (see Chapter 5).

EPA Community Right-to-Know Activities

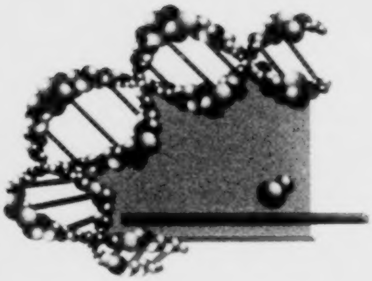


EPA is responsible for implementing the provisions of EPCRA. The legislation mandates the improvement of the Toxic Release Inventory. The TRI is a national database that provides the public with annual information on the environmental release of over 600 toxic chemicals commonly used by industry. More than 31,000 industrial facilities across the country are required to provide EPA with reports on the types and amounts of chemicals they release to the air, land, and water. The reports are presented in an easy to follow format and are made available to the public through on-line services, such as the National Library of Medicine (NLM) and the Right-to-Know Network (RTK-NET), public libraries, and EPA.

EPA has adopted a broad focus for TRI to meet the needs of communities, local governments, academia, industry, and public policy groups. Because of TRI's reporting requirements, hazardous emissions have been reduced by 61 percent since 1987. EPA will use the TRI program to ensure that parents, teachers, and health care providers are aware of all sources of contamination that may affect children's health.

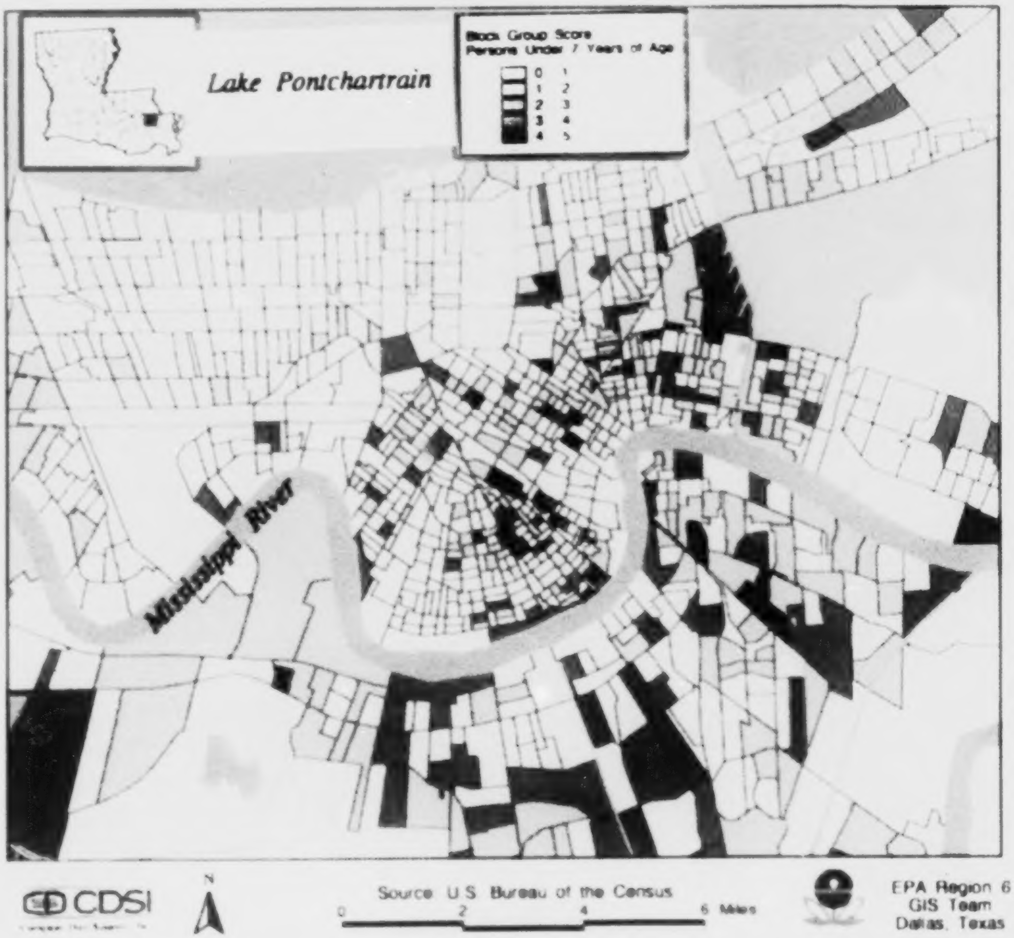
President Clinton is directing federal agencies to build on the success of the right-to-know laws and develop proposals to provide families with better information about the risks they face from toxics and other hazards. This initiative will include common-sense and cost-effective ways to assist parents in avoiding environmental health risks to children from products and chemicals. The initiative also provides information on environmental health risks, such as cancer, developmental, hormonal, and reproductive risks. This information encourages informed consumer choices.

The President directed EPA to work with other federal, state, and local agencies to establish a nationwide network for observing key environmental health indicators in the air,



land, and water. Families will have access to the timely health-related data generated from these observations. They may then use the information to make informed choices that directly affect themselves. For instance, timely information on air quality can mean the difference between hospitalization and a healthy day for an asthmatic child.

New Orleans Children Aged 6 and Under


Lake Pontchartrain
Block Group Score
Persons Under 7 Years of Age
0 1
1 2
2 3
3 4
4 5
Mississippi River
CDSI
N
0
2
4
6 Miles
EPA Region 6
GIS Team
Dallas, Texas

Source U.S. Bureau of the Census

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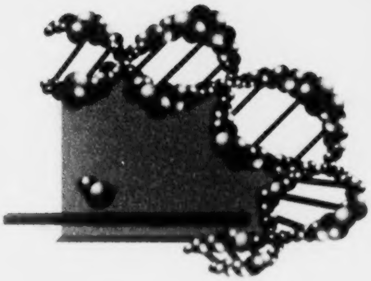
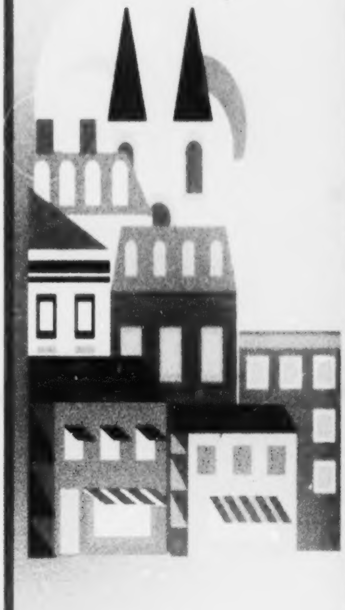


Environmental health indicators are being developed for use in detecting trends in public health impacts of environmental contaminants. This includes developing an aggregated index of environmental health conditions for children. EPA Region 3 has produced a vulnerability index based on information contained in the TRI. The vulnerability index provides a description of socioeconomic and demographic characteristics that may render a subpopulation (*e.g.*, children) more susceptible than the general population. A similar geographic information system (GIS) maintained by Region 6 can evaluate the potential occurrence of respiratory diseases, lead exposures, and waterborne diseases in local communities, and can be used to warn communities of potential health problems for their children. A sample of the demographic information available through the GIS is shown in the graph above.

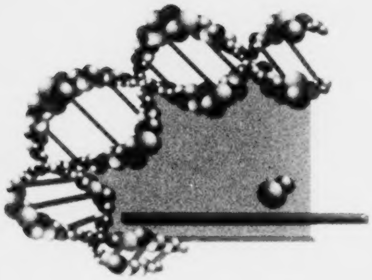
EPA also monitors regulatory compliance. EPA enforcement personnel conduct routine monitoring and oversight of the data submitted by facilities for the TRI to detect facilities that fail to report as required, to identify waste streams that should have been reported and were not, and to evaluate the integrity of the data submitted to EPA.

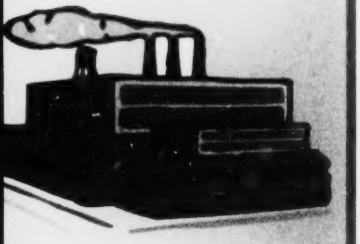


EPA Community Right-to-Know Projects

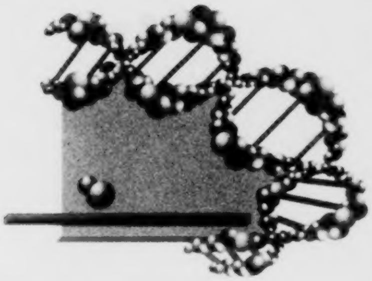
Title:	Toxic Release Inventory
Description:	The Toxic Release Inventory is a national database that provides the public with annual release information on over 600 toxic chemicals commonly used by U.S. industry. This inventory requires that each of 31,000 industrial facilities across the nation provide EPA with chemical-specific reports on the amount of chemicals they release to the air, land, and water. The reports are made available to the public in a variety of means, including on-line services, public libraries, and by request, from EPA. As part of ongoing efforts to enhance family right-to-know, EPA is developing TRI chemical fact sheets for parents and a Sector Facility Indexing project that will provide profiles of the environmental performance of five major industries.
Contact:	Office of Prevention, Pesticides, and Toxic Substances, Darlene Dinkins, 703-305-5214

Title:	Enforcement Activities to Help Ensure Compliance with the Emergency Planning and Community Right-to-Know Act (EPCRA)
Description:	Over the past several years, EPA has initiated a focused enforcement effort aimed at improving the regulated community's rate of compliance with both

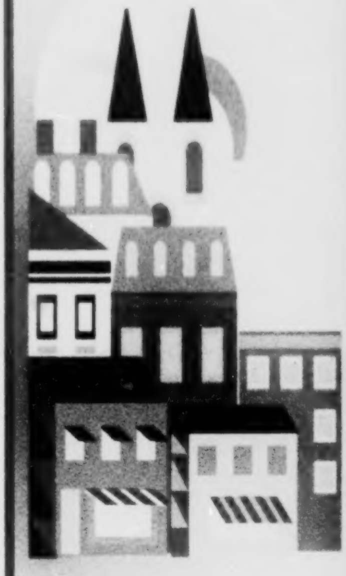


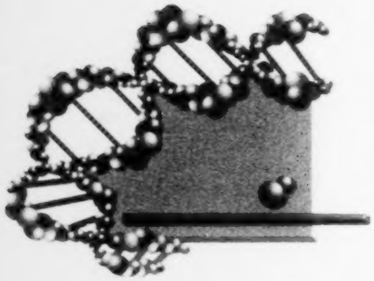


	the emergency planning requirements and the community right-to-know components of EPCRA. For example, each of the ten EPA regional offices reviews databases to detect TRI non-reporters, responds to tips and complaints of potential violations, evaluates the quality of data submitted by the regulated community, and issues enforcement actions for violations. These actions are designed to improve the overall completeness and accuracy of the public inventory of toxic emissions in communities.
Contact:	Office of Enforcement and Compliance Assurance, Dean Ziegel, 202-564-4038
Title:	Potential Exposure to Environmentally Released Chemicals and Childhood Cancer
Description:	This project is an analysis of chemical releases, as documented in the Toxic Release Inventory (TRI) database, and childhood cancer mortality rates for children between the ages of one and 19 in the United States.
Contact:	Office of Research and Development, Denise Lewis, 919-966-6385
Title:	Children's Environmental Health Index for the United States
Description:	EPA is developing environmental indicators to detect trends in public health impacts of environmental contaminants and assess whether environmental programs are protecting the health of the public and our children. The results will be used to develop an index of health impacts on children. The indicators will help identify the environmental chemicals that can contribute to adverse health effects. An air index will be developed to provide an aggregate estimate of exposure to all six criteria air pollutants. Respiratory diseases in children will be included. Future work will consider other children's health outcomes, such as cancer and developmental effects.
Partners:	World Resources Institute and School of Public Health at the University of California, Berkeley
Contact:	Office of Policy, Tracy Woodruff, 202-260-6669



Title:	Chemical Indexing System for Toxic Release Inventory, Part II: Vulnerability Index
Description:	The vulnerability index provides a description of socioeconomic characteristics that may render a subpopulation more susceptible to toxic releases than the general population. It includes income and minority status as well as methods for considering other factors, including number of persons age 14 or under, that may influence the vulnerability of subpopulations. The index will be used in conjunction with Part I of the Chemical Indexing System to estimate the relative hazard of chemical releases.
Contact:	Region 3, Debra Forman, 215-566-2073
Title:	Use of a Geographic Information System (GIS) to Gather and Analyze Information for Regional Programs
Description:	A GIS system maintained by EPA Region 6 includes community-level data associated with economic status, minority representation, proximity to known pollution sources, cumulative impact concerns, enforcement activities, and other environmental parameters. The analytical capabilities of the system can improve awareness of children's issues. Maps indicate areas of concern for environmental problems and children's health. The system can evaluate the potential for respiratory diseases, lead exposures, and waterborne diseases and relate them to areas where many families with children are likely to reside. Vulnerability factors, such as low economic status, also can be considered. The system can access state health monitoring and epidemiology information that can be used to show relationships among environmental exposures, population characteristics, and children's diseases.
Contact:	Region 6, Gerald Carney, 214-665-6523





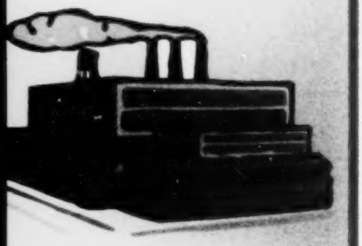
Title: Consumer Labeling Initiative

Description: In 1995, EPA began its Consumer Labeling Initiative to develop labeling for products that is easy to understand and allows parents to make more informed choices. EPA has initiated a pilot project focused on indoor insecticides, outdoor pesticides, and household antimicrobial products—all products that are present in children's environments.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Darlene Dinkins, 703-305-5214

Title: Poison Prevention

Description: Accidental poisoning from pesticide chemicals around the household remains a serious concern for children. EPA is an active member of the Poison Prevention Council, and annually distributes thousands of fact sheets on pesticides and child safety to medical establishments and the general public. As a result of the Poison Prevention Week outreach in 1995, EPA sent a poison prevention message to 3.5 million television viewers.



Contact: Office of Prevention, Pesticides, and Toxic Substances, Darlene Dinkins, 703-305-5214

Title: Consumer Pesticide Right-to-Know Brochure

Description: The FQPA requires that EPA develop an annual brochure that discusses the risks and benefits of pesticides. The brochure will be distributed through large retail grocers and will provide information for consumers on how they can reduce their exposure to pesticide residues on food. This program will allow parents to make more informed choices for their families.

Contact: Office of Prevention, Pesticides, and Toxic Substances, Darlene Dinkins, 703-305-5214

CHAPTER 11

Children's Health Resources

This chapter contains sources of additional information, lists of EPA publications related to children's health topics, and references for hotlines and Internet resources. Most of the resources listed below focus specifically on children or issues of primary importance during the developmental years. Others address EPA efforts to protect the environment where children live, learn, and play. The listing is not intended to be exhaustive, but to allow readers to better understand how to protect children's health.

Contacting EPA

For additional information on the EPA children's environmental health projects inventoried in this document, you may call the individuals listed as contacts for each project. To contact other individuals and offices within the U.S. Environmental Protection Agency, address all correspondence using the following addresses and telephone numbers:

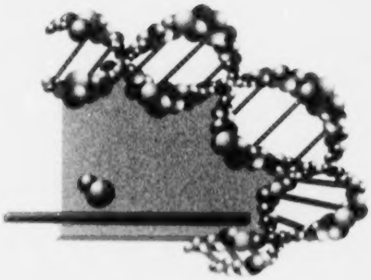
EPA Headquarters

Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460
Administrator's Hotline: 202-260-1000
Toll Free Number: 888-372-8255
Internet: http://www.epa.gov
Children's Health Web page: http://www.epa.gov/children

EPA Regions

Region 1 (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut)

Environmental Protection Agency
One Congress Street
John F. Kennedy Building
Boston, MA 02203-0001
Phone: 617-565-3420
Fax: 617-565-3660
Internet: http://www.epa.gov/region1



Region 2 (New York, New Jersey, Puerto Rico, Virgin Islands)

Environmental Protection Agency
290 Broadway
New York, NY 10007-1866
Phone: 212-637-3000
Fax: 212-637-3526
Communications Division: 212-637-3660
Internet: http://www.epa.gov/region2

Region 3 (Pennsylvania, Delaware, District of Columbia, Maryland, Virginia, West Virginia)

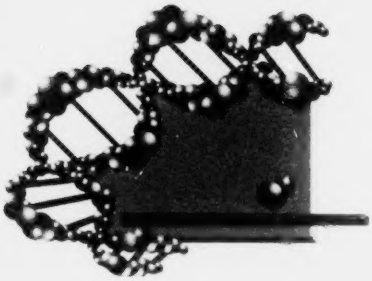
Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107
Phone: 215-566-5000
Fax: 215-566-5103
Customer Service Center: 800-438-2474
Internet: http://www.epa.gov/region3

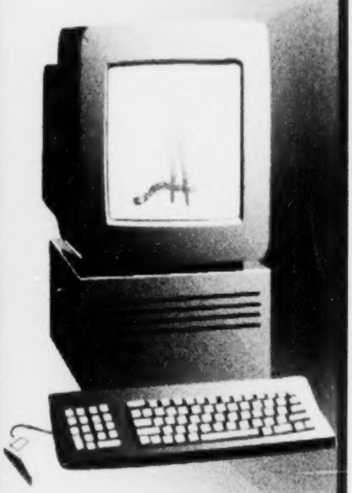
Region 4 (Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia, Florida)

Environmental Protection Agency
61 Forsyth Street, S.W.
Atlanta, GA 30303
Phone: 404-562-9900
Fax: 404-562-8174
Public Affairs and Information: 404-562-8327
Internet: http://www.epa.gov/region4

Region 5 (Minnesota, Wisconsin, Illinois, Michigan, Indiana, Ohio)

Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604-3507
Phone: 312-353-2000
Fax: 312-353-4135
Toll Free Number: 800-621-8431
Internet: http://www.epa.gov/region5





Region 6 (New Mexico, Texas, Oklahoma, Arkansas, Louisiana)

Environmental Protection Agency
Fountain Place 12th Floor, Suite 1200
1445 Ross Avenue
Dallas, TX 75202-2733
Phone: 214-665-6444
Fax: 214-665-7113
General Information: 214-665-2200
Internet: http://www.epa.gov/earth1r6/index.htm

Region 7 (Nebraska, Kansas, Iowa, Missouri)

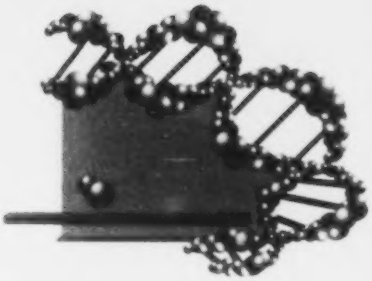
Environmental Protection Agency
726 Minnesota Avenue
Kansas City, KS 66101
Phone: 913-551-7000
Fax: 913-551-7467
Toll Free Number: 800-223-0425
Internet: http://www.epa.gov/region7

Region 8 (Montana, North Dakota, Wyoming, South Dakota, Utah, Colorado)

Environmental Protection Agency
999 18th Street, Suite 500
Denver, CO 80202-2466
Phone: 303-312-6312
Fax: 303-312-6339
Environmental Information Service Center: 800-227-8917
Internet: http://www.epa.gov/region8

Region 9 (California, Nevada, Arizona, Hawaii)

Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105
Phone: 415-744-1305
Fax: 415-744-2499
General Public Inquiries: 415-744-1500
Internet: http://www.epa.gov/region9



Region 10 (Washington, Oregon, Idaho, Alaska)

Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101
Phone: 206-553-1200
Fax: 206-553-0149
Toll Free Number: 800-424-9372
Internet: http://www.epa.gov/region10

EPA also operates a number of hotlines and clearinghouses. Those that offer publications and information relevant to topics covered in this report are listed in the appropriate sections below. For information on other EPA offices, locations, public information centers, hotlines, and clearinghouses, check the EPA home page or call the regional office nearest you.

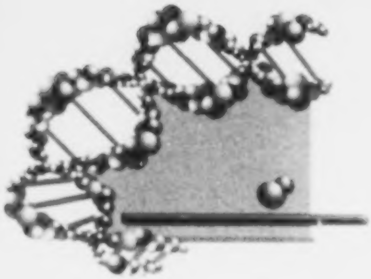
Obtaining EPA Publications

EPA is making important progress to provide the public with information to protect children's health. The following tables list Web addresses for obtaining EPA information and direct links to other resources available on the Internet. It is also possible to call or write EPA to request copies of documents. General sources of EPA documents include:

- The National Center for Environmental Publications and Information (NCEPI) is a central repository for all EPA documents, with over 5,500 titles in paper and electronic format available for distribution (usually at no cost to the public). Individuals can browse and search EPA's National Publications Catalog, and order EPA Publications online or by telephone at 800-490-9198. The EPA publication number (*e.g.*, EPA 999-F-99-999) is used to identify the resource.

NCEPI
National Center for Environmental Publications and Information
P.O. Box 42419
Cincinnati, OH 45242-2419
Phone: 800-490-9198
Fax: 513-489-8695
Internet: http://www.epa.gov/ncepihom

Some documents not available free of charge through NCEPI can be obtained for a charge through the Government Printing Office (GPO) or the National Technical Information Service (NTIS).



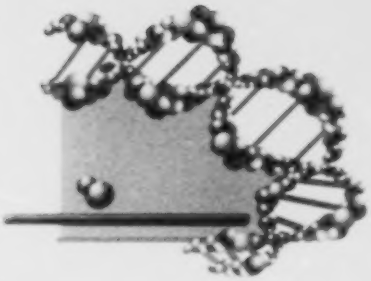
- NTIS is a central resource for government-sponsored U.S. and international scientific, technical, engineering, and business-related information. As a self-supporting agency of the U.S. Department of Commerce, NTIS covers its business and operating expenses with the sale of its products and services. For EPA publications, NTIS indexes publications by their EPA publication number, complete title, and by an NTIS product number. NTIS accepts VISA and MasterCard.

  NTIS
  National Technical Information Center
  5285 Port Royal Road
  Springfield, VA 22151
  Phone to Order: 800-553-6847 or 703-605-6000
  Fax: 703-321-8547
  E-Mail Online Ordering: orders@ntis.fedworld.gov
  Internet: http://www.ntis.gov

- Documents available from the Government Printing Office can be obtained for a fee by calling or writing to the address below. GPO also accepts VISA and MasterCard. Place orders by title or appropriate order number.

  U.S. Government Printing Office
  Superintendent of Documents
  PO Box 371954
  Pittsburgh, PA 15250-7954
  Phone: 202-512-1800
  Fax: 202-512-2250
  Internet: http://www.access.gpo.gov/su_docs/sale/prf/prf.html

Additional publications and interlibrary loans of EPA documents are available through the EPA library system. The EPA Headquarters Information Resources Center provides access to EPA information for U.S. and international requests, and has a range of information services consisting of environmental and related subjects, including online searching of commercial databases. The focus of the EPA collection is on environmental regulations, policy, planning, and administration. The library also maintains a large collection of EPA documents on microfiche and in hard copy. Libraries are located in EPA regional offices and laboratories across the country. For information contact:



Headquarters Information Resources Center
Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460
Phone: 202-260-5921
Fax: 202-260-5153
E-mail: library-hq@epamail.epa.gov
Internet: http://www.epa.gov/natlibra

EPA Materials, Tools, and Internet Resources Related to Children's Health

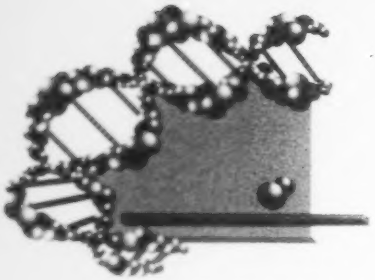
This section contains information resources specific to the health effects and environmental contaminants addressed in the *Children's Environmental Health Yearbook*. Under each topic, general resources—such as hotlines and clearinghouses—are listed first, followed by an alphabetical listing of relevant EPA publications. For each document, one or more sources for obtaining the information is indicated in the right hand column. Sources may be one of the major document distribution centers or EPA offices listed above, an Internet site address, or one of the topic-specific clearinghouses or hotlines. A specific individual contact and telephone number are provided where needed.

Asthma and Other Respiratory Effects

Information Resources for Indoor Air Quality

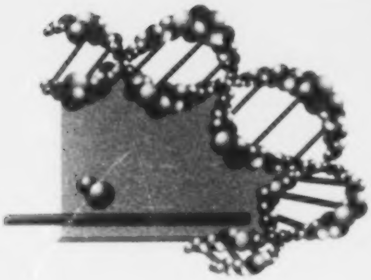
Indoor Air Quality Information Clearinghouse (IAQINFO)
P.O. Box 37133
Washington, DC 20013-7133
Phone: 800-438-4318; 202-484-1307
Fax: 202-484-1510
E-mail: iaqinfo@aol.com
Internet: http://www.epa.gov/iaq/iaq-pubs.html

The IAQ Information Clearinghouse provides information pertaining to indoor air pollutants, their sources, health effects, and methods for testing, measuring, and controlling indoor air pollution. Information about maintaining homes, schools, and other buildings to minimize indoor air quality problems is available.

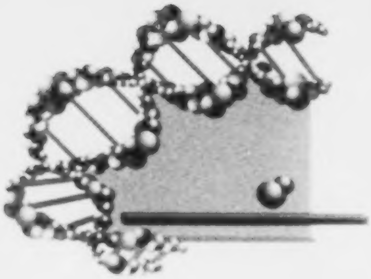


Indoor Air Quality Publications and Sources

Publication	Source
A Special Alert for People with Asthma in the Northeast Ohio Area (EPA 905-K-001, May 1997)	Region 5, Indoor Air Coordinator, 312-353-2205
A Special Alert for People with Asthma in the Greater Cincinnati, Northern Kentucky Metropolitan Area (EPA 905-K-002, May 1997)	Region 5, Indoor Air Coordinator, 312-353-2205
A Special Alert for People with Asthma in the Greater St. Louis Metropolitan Area (EPA 905-K-003, May 1997)	Region 5, Indoor Air Coordinator, 312-353-2205
A Special Alert for People with Asthma in the Chicago Metropolitan Area and Northwest Indiana (EPA 905-K-004, May 1997)	Region 5, Indoor Air Coordinator, 312-353-2205
A Special Alert for People with Asthma in Southeast Wisconsin (EPA 905-K-005, May 1997)	Region 5, Indoor Air Coordinator, 312-353-2205
Asthma, Air Quality, and Environmental Justice: EPA's Role in Asthma Education and Prevention (EPA 402-F-95-001, July 1995, IAQ-0084)	IAQINFO
Carpet and Indoor Air Quality Fact Sheet (EPA 402-F-94-011, October 1992, IAQ-0040)	IAQINFO
Cual es el problema con el aire? (EPA 905-K-97-004S, July 1997)	Region 5, Indoor Air Coordinator, 312-353-2205
Flood Cleanup: Avoiding Indoor Air Quality Problems Fact Sheet (EPA 402-F-93-005, August 1993, IAQ-0061)	IAQINFO



Publication	Source
How Healthy Is the Air in Your Home? A Room-by-Room Checklist for Your Home's Indoor Air Quality (EPA 402-F-97-001)	IAQINFO
IAQ Tools for Schools Action Kit	All except the problem solving wheel and video available at http://www.envirovillage.com/tools/NDefault.htm. GPO sells the complete kit and extra wheels.
IAQ Tools for Schools–Ventilation Basics (video)	IAQINFO
Indoor Air Pollution: An Introduction for Health Professionals. (GPO 1994-523-217/81322)	IAQINFO
Indoor Air Quality Basics for Schools Fact Sheet (EPA 402-F-96-004, October 1996, IAQ-0095)	IAQINFO
Protect Your Family and Yourself from Carbon Monoxide Poisoning (EPA 402-F-96-005, October1996) in Spanish (EPA 402-F-97-004, July 1997)	IAQINFO (This fact sheet also is available in Vietnamese, Chinese, and Korean.)
Residential Air Cleaners Fact Sheet (EPA 20A-4001, February 1990, IAQ-0007)	IAQINFO
Sick Building Syndrome Fact Sheet (EPA 402-F-94-004, April 1991, IAQ-0004)	IAQINFO

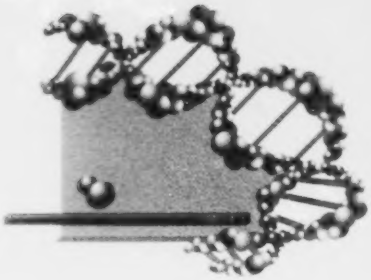


Publication	Source
Targeting Indoor Air Pollution: EPA's Approach and Progress (EPA 400-R-92-012, March 1993)	IAQINFO
The Inside Story: A Guide to Indoor Air Quality (EPA 402-K-93-007, April 1995, IAQ-0009)	IAQINFO
Use and Care of Home Humidifiers Fact Sheet (EPA 402-F-94-010, February 1991, IAQ-0008)	IAQINFO
Ventilation and Air Quality in Offices Fact Sheet (EPA 402-F-94-003, July 1990, IAQ-0003)	IAQINFO
What You Should Know about Combustion Appliances and Indoor Air Pollution (EPA 400-F-91-100)	IAQINFO

Information Resources for Outdoor Air Pollution

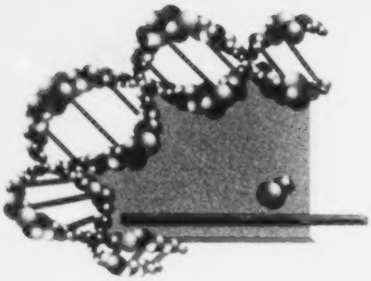
Office of Air and Radiation
Office of Mobile Sources
2565 Plymouth Road
Ann Arbor, MI 48105-2498
Phone: 313-668-4207
Internet: http://www.epa.gov/OMSWWW/consumer.htm

National Vehicle and Fuel Emissions Laboratory (NVFEL)
2565 Plymouth Road
Ann Arbor, MI 48105-2498
Phone: 313-668-4311
Fax: 313-668-4368

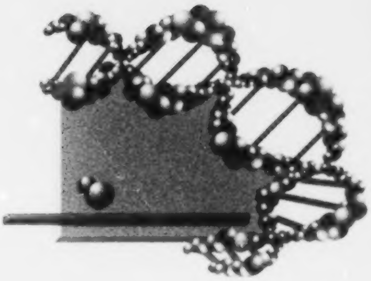


Outdoor Air Pollution Publications and Sources

Publication	Source
Air Toxics from Motor Vehicles (EPA 400-F-92-004, Fact Sheet OMS-2, August 1994)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Automobile Emissions: An Overview (EPA 400-F-92-007, Fact Sheet OMS-5, August 1994)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Automobiles and Carbon Monoxide (EPA 400-F-92-005, Fact Sheet OMS-3, January 1993)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Be a Grower Not a Mower Fact Sheet (EPA 420-F-96-018)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Boating Pollution Prevention Tips Fact Sheet (EPA 420-F-96-003)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Car Owners: Protect the Environment and Your Health, Don't Tamper With Emissions Controls! (EPA 420-F-93-004)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Commute Alternative Brochure (EPA 420-F-95-011)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Commute Alternative Poster (EPA 420-H-95-002)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Control of Emissions from Nonroad Engines Fact Sheet (EPA 420-F-96-009)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm



Publication	Source
Health and Environmental Effects of Particulate Matter, July 1997	http://ttnwww.rtpnc.epa.gov/naaqsfin/pmhealth.htm
Nonroad Engines and Air Pollution: An Overview (EPA 420-F-94-003)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Tips For Reducing Fuel Spillage Fact Sheet (EPA 420-F-96-002)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Tips to Save Gas and Improve Mileage (EPA 420-F-94-004)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
What You Can Do to Reduce Air Pollution: A Citizens Guide to What Individuals and Communities Can Do to Help Meet the Goals of the Clean Air Act Amendments of 1990 (EPA 450-K-92-002)	NCEPI
Your Car or Truck and the Environment: An Environmental Guide for Owners and Drivers of Cars, Trucks, and Other Motor Vehicles (EPA 420-K-93-001)	NCEPI
Your Car and Clean Air: What YOU Can Do to Reduce Pollution (EPA 400-F-93-002, Fact Sheet OMS-18, August 1994)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm
Your Yard and Clean Air (EPA 420-F-94-002, September 1996)	NVFEL or http://www.epa.gov/OMSWWW/consumer.htm



Information Resources for Ground-Level Ozone

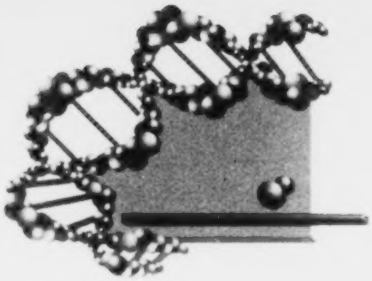
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711
Phone: 919-541-5616
Ground-Level Ozone home page: http://www.epa.gov/airprogm/oar/oaqps/ozone.html
AIRLinks: http://www.epa.gov/oar/oaqps/airlink

Region 1

New England's Air Quality Hotline: 800-821-1237
Anne Arnold, Air Quality Planning Unit, Office of Ecosystem Protection, 617-565-3166
Ground-Level Ozone Information Web Page: http://www.epa.gov/region01/eco/ozone/index.html

Ground-Level Ozone Publications and Sources

Publication	Source
Automobiles and Ozone (EPA 400-F-92-006, Fact Sheet OMS-4, January 1993)	http://www.epa.gov/OMSWWW/consumer.htm
Ground-Level Ozone Air Quality Guide	Region 1, Anne Arnold, Air Quality Planning Unit, Office of Ecosystem Protection, 617-565-3166
Health and Environmental Effects of Ground-Level Ozone Fact Sheet, July 1997	http://ttnwww.rtpnc.epa.gov/naaqsfin/o3health.htm
Ozone Action Days (EPA 905-K-96-001)	Region 5, http://www.epa.gov/region05/air/naaqs/ozoneday.htm
Ozone Action Days: A Special Alert for People with Asthma and Other Respiratory Problems (EPA 905-F-95-001, May 1995)	Region 5, http://www.epa.gov/region05/air/naaqs/ozoneday.htm



Publication	Source
Ozone Action Days: A Special Alert for Asthmatics and Persons with Respiratory Illness: Lake Erie Pamphlet	Region 5. http://www.epa.gov/region05/air/naaqs/ozoneday.htm
Ozone Action Days: A Special Alert for Asthmatics and Persons with Respiratory Illness: Lake Michigan Pamphlet	Region 5. http://www.epa.gov/region05/air/naaqs/ozoneday.htm
Ozone Action! For Better Health in Southeast Michigan (EPA 905-K-007, May 1997)	Region 5. http://www.epa.gov/region05/air/naaqs/ozoneday.htm
Safety Tips for Protecting Your Children (Ozone)	Region 5. http://www.epa.gov/region05/air/naaqs/ozoneday.htm

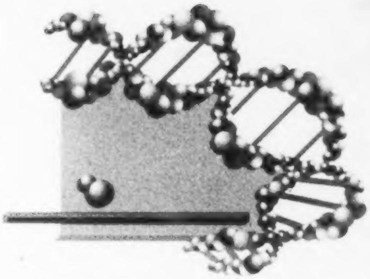
Childhood Cancer

Information Resources for Radon

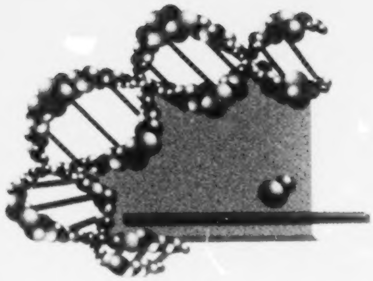
Indoor Air Quality Information Clearinghouse (IAQ Information)
Radon Information Clearinghouse
Phone: 800-55-RADON
IAQ Radon Publications Web Site: http://www.epa.gov/iaq/radon/pubs/index.html

Radon Publications and Sources

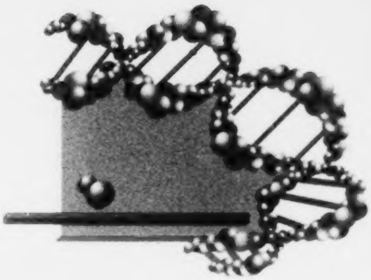
Publication	Source
A Radon Guide for Tenants	IAQ Radon Pubs Web Site Radon Information Clearinghouse
All About Radon (coloring book; English and Spanish)	Region 7. http://www.epa.gov/region07/kids/aar.htm



Publication	Source
Baby Radon Public Service Announcement, 1995	IAQINFO
Basic Information on Radon Resistant New Construction (pamphlet)	http://www.epa.gov/ iaq/construc.html
Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon, Second Edition, (EPA 402-K-92-001, September 1994) (in Spanish: EPA 402-K-93-005, September 1993)	IAQ Radon Pubs Web Site Radon Information Clearinghouse NCEPI
Consumer Federation of America Radon Public Service Announcement (video)	IAQINFO
Consumer's Guide to Radon Reduction: How to Reduce Radon Levels in Your Home (EPA 402-K92-003, August 1992, GPO Order Number ISBN: 0-16-036255-5)	IAQ Radon Pubs Web Site Radon Information Clearinghouse GPO
Dust Particles—Radon Public Service Announcement, 1996 (in English and Spanish)	IAQINFO
Home Buyer's and Seller's Guide to Radon (EPA 402-R-93-003, March 1993)	IAQ Radon Pubs Web Site Radon Information Clearinghouse GPO
Lung Radon Poster	IAQINFO
My Radon Coloring Book	Region 7 http://www.epa.gov/ region07/kids/mrcb1.htm



Publication	Source
Radon Measurement in Schools: Revised Edition Booklet (EPA 402-R-92-014, July 1993)	IAQ Radon Pubs Web Site Radon Information Clearinghouse
Radon Measurement in Schools, Self-Paced Training Workbook (EPA 402-B-94-001)	NCEPI
Radon in Schools Brochure, Second Edition (EPA 402-F-94-009, October 1994)	IAQ Radon Pubs Web Site Radon Information Clearinghouse
Radon Resistant New Construction in Homes (brochure)	IAQ Radon Pubs Web Site Radon Information Clearinghouse
Radon: Risks and Realities (August 13, 1996)	IAQINFO
Radon Video (also available in Spanish)	IAQINFO
Reducing Radon Risks (EPA 520-1-89-027, September 1992)	IAQ Radon Pubs Web Site Radon Information Clearinghouse
Reducing Radon in Schools: A Team Approach (EPA 402-R-94-008, April 1994)	IAQ Radon Pubs Web Site Radon Information Clearinghouse
The Radon Student Activity Book	IAQINFO

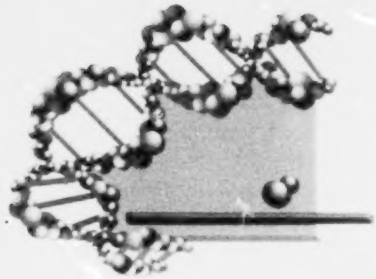


Information Resources for Asbestos

Toxic Substances Control Act (TSCA) Hotline
Phone: 202-554-1404
Fax: 202-554-5603

Asbestos Publications and Sources

Publication	Source
Asbestos Hazard Emergency Response Act Q & A (EPA 745-K-93-023)	TSCA Hotline
Asbestos in the Home: A Homeowner's Guide (EPA 910-K-92-001, August 1992)	TSCA Hotline
Asbestos in Your Home (brochure, EPA 745-F-93-006)	TSCA Hotline
Asbestos Fact Book (EPA 745-K-93-016)	TSCA Hotline
Asbestos in Schools: Evaluation of Asbestos Hazard Emergency Response Act (fact sheet, EPA 745-F-91-100)	TSCA Hotline
Asbestos in Schools: Evaluation of Asbestos Hazard Emergency Response Act (summary report, EPA 745-K-91-101)	TSCA Hotline
Advisory to the Public on Asbestos in Buildings (EPA 745-K-93-014)	TSCA Hotline
The ABCs of Asbestos in School (information packet, EPA 745-K-93-017)	TSCA Hotline



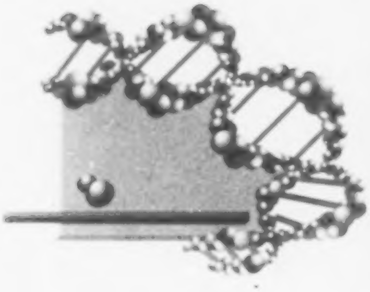
Publication	Source
Proposed Rule on Friable Asbestos Containing Materials in School Buildings: Health Effects and Magnitude of Exposure (support document. EPA 560-12-80-003)	TSCA Hotline

Information Resources for Ultraviolet Light (Sun Protection)

Stratospheric Ozone Hotline: 800-296-1996
Ozone Depletion Resource Center
Internet: http://www.epa.gov/docs/ozone/resource/public.html

Ultraviolet Light (Sun Protection) Publications and Sources

Publication	Source
Action Steps for Sun Protection (fact sheet. EPA 430-F-95-002)	Stratospheric Ozone Hotline Ozone Depletion Resource Center
Be Cool. Cover Up Poster	Region 5. 800-621-8431
Be Sun Smart—Tips For You and Your Children (fact sheet)	Region 3. Betty Ringkamp. 215-566-5663
Health Effects of Overexposure to the Sun (fact sheet. EPA 430-F-95-003)	Stratospheric Ozone Hotline Ozone Depletion Resource Center
How Will a Decreasing Stratospheric Ozone Affect Our Environment? (fact sheet)	Region 3. Betty Ringkamp. 215-566-5663



Publication	Source
Moving Out of CFCs, Benefits of the CFC Phaseout (fact sheet, EPA 430-F-96-020)	Stratospheric Ozone Hotline Ozone Depletion Resource Center
Ozone Science Fact Sheet	Region 3, Betty Ringkamp, 215-566-5663
Ozone Layer Educator's Guide (guidance packet, EPA 430-E-95-003)	NCEPI
Ozone Depletion (fact sheet, EPA 430-F-95-001)	NCEPI
Practice Safe Sun (pamphlet)	Region 5, 800-621-8431
Protecting the Ozone Layer: Safe Disposal of Home Appliances Containing Ozone-Depleting Substances (EPA 430-K-93-001)	NCEPI
Protection of the Ozone Layer (EPA 230-N-95-002)	NCEPI
Radiation: Risks and Realities (EPA 402-K-92-004)	NCEPI
Safe Sun Poster (EPA 905-H-93-002, 1994)	Region 5, 800-621-8431
Safety Tips for Protecting Your Children (fact sheet)	Region 3, Betty Ringkamp, 215-566-5663
Stratospheric Ozone Facts (fact sheet)	Region 3, Betty Ringkamp, 215-566-5663

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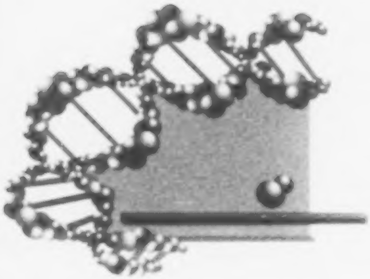
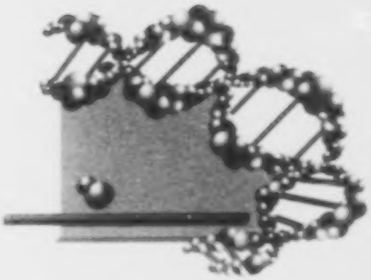


Publication	Source
Sun Protection for Children (fact sheet, EPA 430-F-95-004)	Stratospheric Ozone Hotline Ozone Depletion Resource Center
The Sun, UV and You: A Guide to the UV Index and Sun-Safe Behavior (booklet, EPA 430-K-95-005)	NCEPI
The Ultraviolet Index: What You Need to Know (pamphlet, EPA 430-F-94-016)	Stratospheric Ozone Hotline Ozone Depletion Resource Center
UV Radiation (fact sheet, EPA 430-F-95-006)	NCEPI
What are the CFC Impacts on Stratospheric Ozone? (fact sheet)	Region 3, Betty Ringkamp, 215-566-5663
What Can You Do to Help Prevent Ozone Depletion? (fact sheet)	Region 3, Betty Ringkamp, 215-566-5663
What is the Ultraviolet (UV) Index (fact sheet, EPA 430-H-94-003)	Stratospheric Ozone Hotline Ozone Depletion Resource Center

Developmental and Neurological Toxicity

Information Resources for Lead

National Lead Information Center Hotline and Clearinghouse
Phone: 800-LEADFYI (hotline)
Phone: 800-424-LEAD (clearinghouse)
Fax: 202-659-1192
E-mail: ehc@cais.com
Internet: http://www.epa.gov/opptintr/lead/leadprot.htm

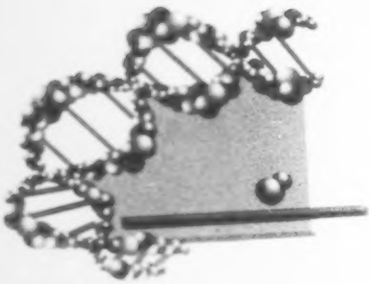


The Hotline is available 24 hours a day, 7 days a week, in English and Spanish. The Hotline distributes a basic information packet on lead that includes the EPA brochure "Lead Poisoning and Your Children," three fact sheets, and a list of state and local contacts for additional information. Callers who have more specific questions are referred to the clearinghouse (800-424-LEAD) and can speak directly with an information specialist. Information specialists provide on-phone technical assistance.

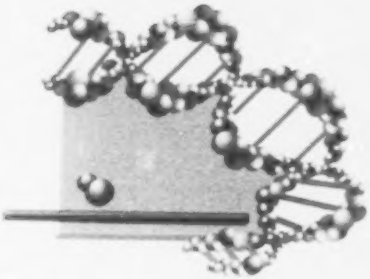
Office of Prevention, Pesticides, and Toxic Substances
U.S. Environmental Protection Agency
401 M Street, S.W. (E637)
Washington, DC 20460
Phone: 202-260-2902
Lead home page: http://www.epa.gov/opptintr/lead/index.html

Lead Publications and Sources

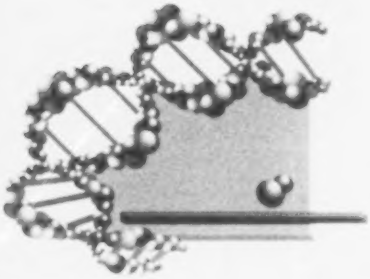
Publication	Source
A New England Guide: Community Resources for Lead Poisoning Prevention Directory (1996)	Region 1, Maureen McClelland, 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Avoiding Dangers in the Dirt (children's workbook)	Region 1, Maureen McClelland, 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Be Safe With Lead-Man (poster)	Region 4, Lead Coordinator, Rose Anne Rudd, 404-562-8998
Children and Lead: What You Can Do? A Guide for Parents and Day Care Providers From Physicians for Social Responsibility	Region 3, Betty Ringkamp, 215-566-5663



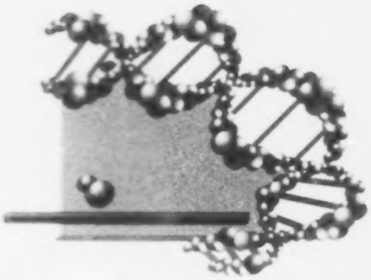
Publication	Source
Controlling Lead In Soils Packet (1995)	Region 1. Maureen McClelland. 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Controlling Lead in Soils Report	Region 1. Maureen McClelland. 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Fact Sheet: Disclosure of Lead-Based Paint Hazards in Housing (EPA 747-F-96-002. March 1996)	National Lead Information Center http://www.epa.gov/opptintr/lead/leadbase.htm
Finding the Right Home (children's workbook)	Region 1. Maureen McClelland 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Finding a Qualified Lead Professional for Your Home (EPA 747-F-96-006)	National Lead Information Center http://www.epa.gov/opptintr/lead/leadbase.htm
Going to the Doctor (children's workbook)	Region 1. Maureen McClelland. 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Healthy Yard: Is Your Yard Lead Proof? (poster)	Region 1. Maureen McClelland. 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html



Publication	Source
Healthy Beginnings: Lead Safe Families, an English-as-a-Second-Language Curriculum on Lead Poisoning Prevention (EPA 208-B-93-001, 1996)	Region 1, 617-565-4592 http://www.epa.gov/region01/eco/lead/lppform.html
Home Repairs and Innovations: What You Should Know About Lead-Based Paints	Region 7, 800-223-0425
Identifying Symptoms of Illness (children's workbook)	Region 1, Maureen McClelland, 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Identifying Lead Hazards in Your Home (fact sheet, EPA 747-F-96-007)	NCEPI
Lead in American Schools: What School Districts Should & Should Not Do	Region 3, Betty Ringkamp, 215-566-5663
Lead in Your Drinking Water (EPA 810-F-93-001)	NCEPI Water Resource Center
Lead Prevention Videos: Lead Poisoning—A Parent's Guide to Prevention, Sesame Street Lead Away!, and Living With Lead	National Lead Information Center
Lead Poisoning and Your Children (pamphlet, EPA 800-B-92-002); El Envenenamiento por el Plomo y Sus Ninos (EPA 747-K-95-001)	Region 4, Lead Coordinator, Rose Anne Rudd, 404-562-8998
Lead Poisoning Prevention Wheel	Region 7, 800-223-0425



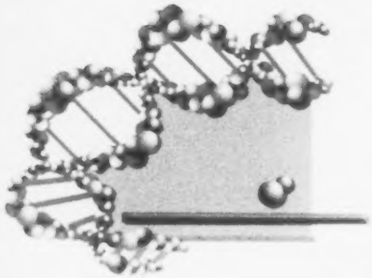
Publication	Source
Lead in Drinking Water Coolers (fact sheet, EPA 810-F-90-021)	NCEPI Water Resource Center
LEAD: A Cross Program Strategy (1993)	Region 1, Maureen McClelland, 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Lead-Free Kids, Lead-Free Homes (pamphlet)	Region 3, Betty Ringkamp, 215-566-5663
Lead—Is Your Child At Risk? (pamphlet)	Region 3, Betty Ringkamp, 215-566-5663
Let's Get the Lead Out 1997 Teaching Materials	Region 5, 800-621-8431
Making Your Kids & Your Home Safe from Lead Poisoning (pamphlet)	Region 3, Betty Ringkamp, 215-566-5663
Our Mid-Atlantic Environment-25 Years of Progress (EPA 903-R-017, December 1995)	Region 3, Betty Ringkamp, 215-566-5663
Preparing and Storing Food (children's workbook)	Region 1, Maureen McClelland, 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Protect Your Family from Lead in Your Home (pamphlet, EPA 747-DK-94-001, May 1995); Poteja a Su Familia del Plomo en Su Casa (EPA 747-K-94-001S)	National Lead Information Center



Publication	Source
Protecting Your Child from Lead Poisoning (pamphlet, 1993)	Region 1, Maureen McClelland, 617-565-3232 http://www.epa.gov/region01/eco/lead/lppform.html
Protecting Your Family from Lead Poisoning: Como Proteger a Sus Hijos y Su Hogar contra el Envenenamiento por Plomo (pamphlet)	Region 3, Betty Ringkamp, 215-566-5663
Questions & Answers on the EPA/HUD Disclosure Rule (EPA 747-F-96-001, March 1996)	National Lead Information Center http://www.epa.gov/opptintr/lead/leadbase.htm
Questions Parents Ask About Lead Poisoning	Region 7, 800-223-0425
Reducing Lead Hazards When Remodeling Your Home (EPA 747-R-94-002, April 1994); Como Reducir Los Peligros del Plomo al Remodelar Su Casa (EPA 747-R-94-002S)	National Lead Information Center
Testing Your Home for Lead	Region 7, 800-223-0425

INFORMATION RESOURCES FOR ENDOCRINE DISRUPTORS AND OTHER NEUROTOXICS

Office of Research and Development
National Health and Environmental Effects Research Laboratory
Research Triangle Park, NC 27711
Phone: 919-541-2281
Endocrine Disruptors Research Initiative home page: http://www.epa.gov/endocrine



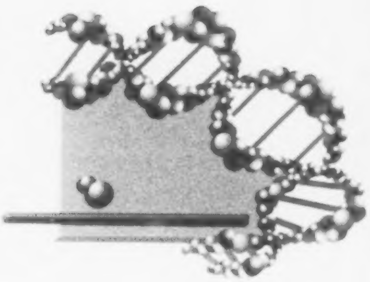
Endocrine Disruptors and Other Neurotoxics Publications and Sources	
Publication	**Source**
Endocrine Disruptor Research Initiative: Relevant Research Publications	http://www.epa.gov/endocrine/pubs.html
Public Health Implications of PCB Exposures (ATSDR/EPA Report, December 1996)	Region 5
Special Report on Environmental Endocrine Disruption: An Effects Assessment and Analysis (EPA 630-R-96-012)	http://www.epa.gov/endocrine/pubs.html
Workshop Report on Developmental Neurotoxic Effects Associated with Exposure to PCB's (EPA 630-R-92-004)	http://www.epa.gov/endocrine/pubs.html
Report to Congress on Mercury (Office of Air and Radiation, December 1997)	http://www.epa.gov/oar/mercury.html

Health Effects of Pesticides

Information Resources for Pesticides

Office of Pesticide Programs (OPP)
Communication Branch
U.S. Environmental Protection Agency
401 M Street, S.W. (7506C)
Washington, DC 20460
Phone: 703-305-5017

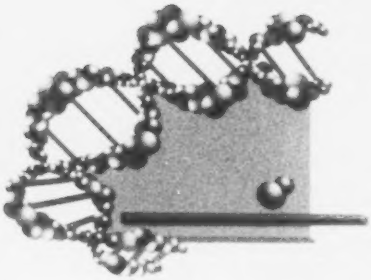
National Pesticide Telecommunications Network (NPTN) Hotline
Toll Free Number: 800-858-7378
Internet: http://ace.orst.edu/info/nptn/
E-Mail: nptn@ace.orst.edu



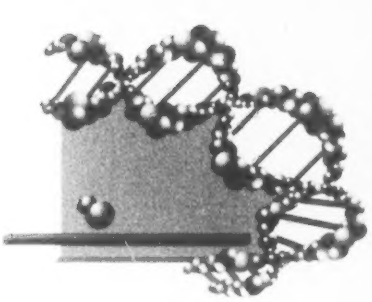
A national toll-free telephone information service provides callers (mainly parents, consumers, medical community, and federal, state and local governments) with poisoning prevention and technical information on pesticide active ingredients and product registrations in the United States.

Pesticides Publications and Sources

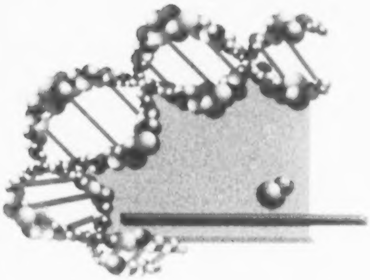
Publication	Source
Child-Resistant Packages for Pesticides	Region 4, Wilson Harvard, 404-562-9002
Citizen's Guide to Pest Control and Pesticide Safety (EPA 730-K-95-001, September 1995)	NCEPI
Diagnostico y Tratamiento de Los Envenenamientos por Plaguicidas, Cuarta Edicion (Spanish, EPA 540-R-95-024)	NCEPI
Do You Really Need a Pesticide? (EPA 910-F-94-004)	Region 10, 800-424-9372
Emergency Action Guide for Pesticide Incidents (1992)	Region 5, Pesticides Program Section, 312-353-2192
For Your Information: Protecting the Public from Pesticide Residues in Food (fact sheet, EPA 735-F-96-001)	NCEPI
Growing Food Crops on City Lots (fact sheet, June 1994)	Region 5, Pesticides Program Section, 312-353-2192
Integrated Pest Management (poster, EPA 735-H-92-001)	NCEPI



Publication	Source
Methyl Parathion in the Chicago Area (1997)	Region 5, 312-353-2000
Office of Pesticide Programs Annual Report for 1996 (EPA 735-R-96-001)	NCEPI
Pest Control in the School Environment: Adopting Integrated Pest Management (brochure, EPA 735-F-93-012)	NCEPI
Pesticide Poisoning Action Guide for Agricultural Pesticides in the Midwest: Resource Directory for Medical Personnel (EPA 905-B-94-001, May 1994)	Region 5, 312-353-2000
Pesticides and Child Safety (EPA 735-F-93-050R)	NCEPI
Protect Yourself from Pesticides: A Guide for Pesticide Handlers (EPA 735-B-93-003)	NCEPI
Protect Yourself from Pesticides: A Guide for Agricultural Workers/ Protejase de Los Pesticidas: Guia para Los Trabajadores Agricolas (EPA 735-B-93-002)	NCEPI
Protect Yourself from Pesticides (poster, EPA 735-H-93-001)	NCEPI
Protejase de Los Pesticidas: Guia Para Los Que Manejan Pesticidas (EPA 735-B-94-001)	NCEPI
Recognition and Management of Pesticide Poisonings (Fourth Edition, EPA 540-R-98-001)	NCEPI



Publication	Source
Status of Pesticides in Re-Registration and Special Review (Rainbow Report, EPA 738-R-94-008)	NCEPI
Steps to Protect Yourself from Pesticides (English/Laotian: EPA 735-F-95-006) (English/Cambodian: EPA 735-F-95-005) (English/Vietnamese: EPA 735-F-95-004) (English/Haitian Creole: EPA 735-F-95-003) (English/Spanish: EPA 735-F-95-002)	NCEPI
10 Tips to Protect Children from Pesticide and Lead Poisonings around the Home (English/Spanish, EPA 735-F-97-001)	NCEPI
The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Federal Food, Drug, and Cosmetic Act (FFDCA) as amended by the Food Quality Protection Act (FQPA) of August 3, 1996 (EPA 730-L-97-001)	NCEPI
To Spray or Not To Spray (pamphlet, EPA 905-F-95-003)	Region 5, 312-353-2000
What You Need to Know About Methyl Parathion and Your Health (fact sheet, 1997)	Region 5, 312-353-2000
Wood Preservatives for Applicators (booklet, 1987)	Region 5, 312-353-2000



Potential Risks from Contaminated Water

Information Resources for Contaminants in Drinking Water, Surface Water, and Fish

Safe Drinking Water Hotline
Phone: 800-426-4791
E-Mail: hotline-sdwa@epamail.epa.gov

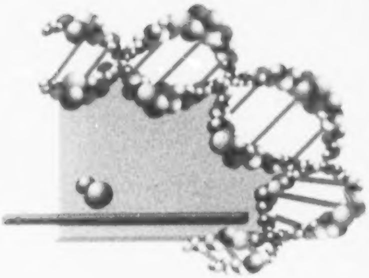
The Safe Drinking Water Hotline is available to help the public, drinking water stakeholders, and state and local officials understand the regulations and programs developed in response to the Safe Drinking Water Act (as amended in 1986 and 1996). This includes information about drinking water regulations and publications, source water protection programs, and public education materials. The Hotline can be reached Monday through Friday (except federal holidays) from 9 a.m. to 5:30 p.m. (Eastern Standard Time).

EPA's Office of Water Resource Center
Water Resource Center (RC4100)
Room 2615 Mall
401 M Street, S.W.
Washington, DC 20460
Phone: 202-260-7786
Fax: 202-260-0386
E-mail: waterpubs@epamail.epa.gov

EPA's Office of Water Resource Center is a one-stop location for information and materials produced by the Office of Ground Water and Drinking Water, the Office of Science and Technology, and the Office of Wastewater Management, within EPA's Office of Water. Materials available include: fact sheets, guidance manuals, technical reports, models, educational kits, training materials, brochures, videotapes, and posters. The Office of Water Resource Center is open from 8:30 a.m. to 5:00 p.m. EST.

Office of Water Web Site
Internet: http://www.epa.gov/ow

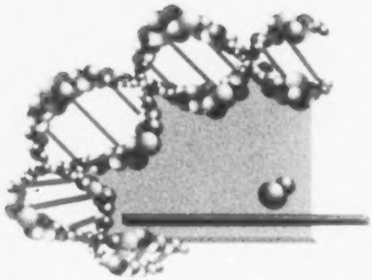
EPA's Office of Water web site contains current information about a variety of office of water responsibilities. The Office of Ground Water and Drinking Water site contains information about the public water system program and standards established for contaminants. The Office of Science and Technology site contains information about beaches and fish, as well as contaminant health advisories. The Office of Wetlands, Oceans, and Watersheds site includes information about watershed protection. The Office of Wastewater Management site includes materials on control and prevention of water pollution from industrial discharge and sludge.



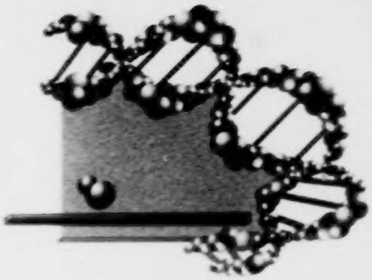
Great Lakes National Program Office
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3507
Phone: 312-353-2000
Fax: 312-353-4135

Contaminated Drinking Water, Surface Water, and Fish Publications and Sources

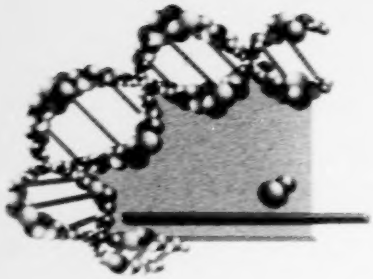
Publication	Source
Before You Go to the Beach (EPA 820-K-97-001, September 1997)	Water Resource Center
Drinking Water and Health (EPA 811-F-95-002-C, October 1995)	Water Resource Center
Drinking Water Counts on You: Blue Thumb Kit (EPA 810-B-97-001)	NCEPI
Drinking Water Heatth Fact Sheet on Atrazine	Water Resource Center
Drinking Water Health Advisories (fact sheet listing)	Water Resource Center
Great Lakes Water Quality Initiative Case Studies Show Benefits Outweigh Costs (fact sheet, EPA 820-F-95-002)	Great Lakes National Program Office, Region 5, 312-353-3612
Great Lakes Water Quality Initiative: A Summary (fact sheet, EPA 820-S-95-001)	Great Lakes National Program Office, Region 5, 312-353-3612
Indicator I: Population Served by Community Drinking Water Systems Violating Health-Based Requirements (Safe Drinking Water Information System)	Water Resource Center



Publication	Source
Kids Can Help Save Our Streams! (EPA 840-F-96-900)	NCEPI
Lead in Drinking Water: An Annotated List of Publications (EPA 812-K-93-001, October 1993)	Water Resource Center
National Listing of Fish Consumption Advisories (fact sheet, EPA 823-F-96-006)	Water Resource Center
National Listing of Fish Consumption Advisories Software (7 disk set, EPA 823-C-96-011)	NCEPI
National Study of Chemical Residues in Fish (fact sheet, EPA 823-F-92-001, 1992)	NCEPI
National Primary Drinking Water Standards (EPA 810-F-94-001A, February 1994)	NCEPI
National Listing of Fish Consumption Advisories, Update Fact Sheet (EPA 823-F-95-004)	NCEPI
Preamble to National Primary Drinking Water Regulations for Lead and Copper	*Federal Register*, Volume 56, Page 26460
Protecting the Great Lakes: The Cost and Benefits of Reducing Toxic Pollution in Three Communities (EPA 820-F-95-004)	Great Lakes National Program Office, Region 5, 312-353-3612
Public Water Systems Inventory and Compliance Statistics, FY 1991-1995 (EPA 816-R-97-006)	NCEPI



Publication	Source
Safe Drinking Water Act Amendments of 1996: General Guide to Provisions (EPA 810-S-96-001)	NCEPI
Should I Eat the Fish I Catch? (EPA 823-B-97-009, September 1997)	Water Resource Center
Student Activity Sheets For Drinking Water Projects (EPA 810-F-92-003)	Water Resource Center
Summary of U.S. Great Lakes Beach Closings, 1981-1994 (EPA 905-R-97-003)	NTIS
The Great Lakes: An Environmental Atlas and Resource Book (EPA 905-B-95-001)	http://www.epa.gov/reg5oopa/fish/index.htm
The Effects of Great Lakes Contaminants on Human Health: Report to Congress (EPA 905-R-95-017, September 1995)	Great Lakes National Program Office, Region 5, 312-353-3612
U.S. EPA 1997 Supplementary Fish Consumption Advisory for Michigan's Great Lakes Waters Fact Sheet	Region 5 http://www.epa.gov/reg5oopa/fish/index.htm
Water on Tap: A Consumer's Guide to the Nation's Drinking Water (EPA 810-K-97-002, July 1997)	Water Resource Center
Watersheds: Where We Live (poster)	NCEPI
We All Live Downstream (booklet)	Region 3, Betty Ringkamp, 215-566-5663



Environmental Education

Information Resources for Environmental Education

Environmental Education Division
U.S. Environmental Protection Agency
401 M Street, S.W. (1701)
Washington, DC 20460
Phone: 202-260-4865
Fax: 202-260-4095
Internet: http://www.nceet.snre.umich.edu/epa.html

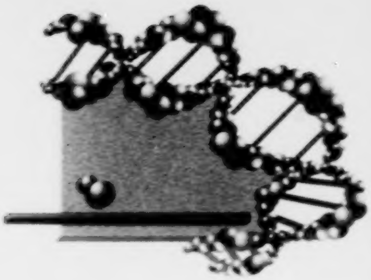
EPA's Environmental Education Division's mission is to advance and support national education efforts to develop an environmentally conscious and responsible public, and to inspire a sense of personal responsibility for the care of the environment in all individuals. For more information regarding Environmental Education Grants, please call 202-260-8619 or fax 202-260-4095.

National Education Association
Health Information Network (NEA, HIN)
1201 16th Street, NW
Washington, DC 20036
Phone: 202-822-7570
Fax: 202-822-7775
Internet: http://www.nea.org/hin

National Parent Teacher's Association
National PTA Headquarters
330 N. Wabash Avenue, Suite 2100
Chicago, IL 60611
Phone: 312-670-6782
Internet: http://www.pta.org/programs/envlibr.htm

Environmental Education Publications and Sources

Publication	Source
1997 PTA Green Almanac	OAR-Sponsored National PTA Resources



Publication	Source
A Guide to Environmental Education Resources (January 1996)	Region 1 http://www.epa.gov/region01/ra/ed/educres.html
Acid Rain: A Student's First Source Book (children's workbook, EPA 600-990-027A)	http://www.epa.gov/acidrain/student/student2.html. Acid Rain Hotline, 202-233-9620.
Environmental Education Grants Program, Federal Fiscal Year 1996	Region 1 http://www.epa.gov/region01/ra/ed/t_grant96.html
Environmental Justice Grants Bulletin	OAR-Sponsored NEA Health Information Network Resources
Environmental Hazards in Your School: A Resource Handbook	Region 3, Betty Ringkamp, 215-566-5663
Environmental Justice and the Indoor Environment (November 1997)	OAR-Sponsored NEA Health Information Network Resources
Guidelines for Prevention, Recognition, and Resolution of Environmentally-Related Illness in Schools	Region 2, Environmental Education, 212-637-3671
HAZ-ED: Classroom Activities for Understanding Hazardous Waste (EPA 540-K-95-005, April 1996)	http://www.epa.gov/superfund/oerr/cio/products/hazed/hazedtoc.htm

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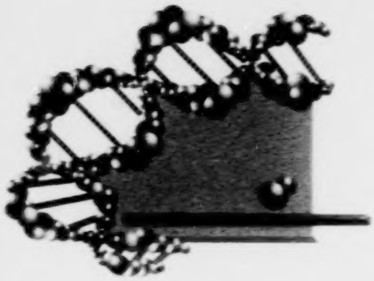
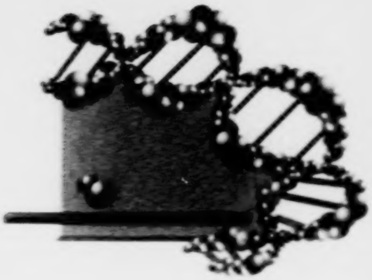


Publication	Source
Internet Teacher's Lounge	http://www.epa.gov/region07/ kids/teachres.htm
Kids Page	Region 7 http://www.epa.gov/ region07/kids/welcome.htm
Leader's Guide to Environmental Issues, February 1997	OAR-Sponsored National PTA Resources
Meeting New York State's Crisis in School Facilities Today	Region 2, Environmental Education, 212-637-3671
NEA Health Information Network: IAQ in Schools	OAR-Sponsored NEA Health Information Network Resources
Report to the New York State Board of Regents on the Environmental Quality of Schools	Region 2, Environmental Education, 212-637-3671
School Recycling Programs: A Handbook for Educators (booklet)	Region 3, Betty Ringkamp, 215-566-5663
Student Activity Sheet: Tracking Pollution, a Hazardous Whodunnit (EPA 810-F-93-003)	NCEPI
The ABC's of Environmental Education (EPA 905-K-94-001)	Region 5, http://www.epa.gov/ region5/enved/html/abc.htm
The Source: Indoor Air, Water and Your Schools (Volumes 1-4, June 1997)	OAR-Sponsored NEA Health Information Network Resources



Publication	Source
The Importance of Parent Involvement in Addressing Children's Environmental Health Issues	OAR-Sponsored National PTA Resources
Workshop Presentation Kit (for use by PTA leaders to conduct environmental workshops at state PTA conventions)	OAR-Sponsored National PTA Resources

Enhanced Community Right-to-Know

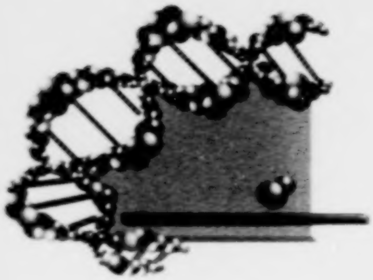
Information Resources for Community Right-to-Know

Office of Prevention, Pesticides, and Toxic Substances
U.S. Environmental Protection Agency
401 M Street, S.W. (E637)
Washington, DC 20460
Phone: 202-260-2902
Toxic Release Inventory (TRI) home page: http://www.epa.gov/opptintr/tri

EPA provides information on accessing and using TRI data; program development; national and international programs; stakeholder dialogue; contacts; latest public data release report; training for newly added industries; guidance documents for newly added industries; and public meetings.

Community Right-to-Know Publications and Sources

Publication	Source
1995 Toxics Release Inventory Public Data Release (EPA 745-R-97-005)	NCEPI
1995 Toxics Release Inventory State Fact Sheets (EPA 745-F-97-001)	NCEPI
Chemicals in the Environment: OPPT Chemical Fact Sheets	http://www.epa.gov/chemfact

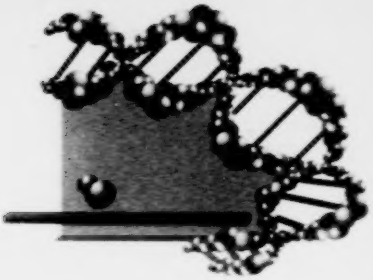


Publication	Source
Consumer Labeling Initiative (CLI)	http://www.epa.gov/opptintr/labeling/index.html
Current List of TRI Chemicals for Reporting Year 1995	http://www.epa.gov/opptintr/tri/chemlst.pdf
Guidance for Chemical Indexing Abstract	http://www.epa.gov/reg3artd/tchem/chemind.htm (for a complete copy, contact Debra L. Forman at 215-566-2073)

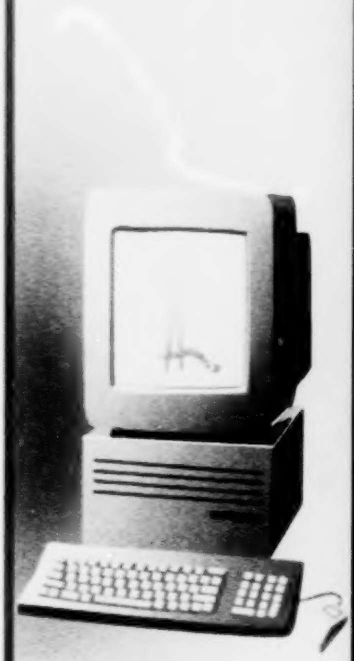
Other Federal Agencies with Programs Related to Children's Environmental Health

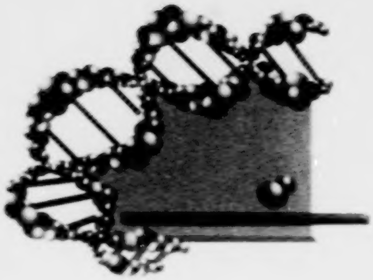
Nearly all federal agencies are pursuing children's environmental health. The Task Force to Reduce Environmental Health Risks and Safety Risks to Children (established by President Clinton's Executive Order on Protection of Children from Environmental Health Risks and Safety Risks) involves:

- **Office of Science and Technology Policy, National Science and Technology Council (NSTC)** Old Executive Office Building, 17th Street and Pennsylvania Avenue, N.W., Washington, DC 20502, 202-456-7116. Internet: http://www.whitehouse.gov/wh/eop/ostc/html/ntsc_home.html
- **Council of Economic Advisers (CEA)** Old Executive Office Building, 17th Street and Pennsylvania Avenue, N.W., Washington, DC 20502, 202-395-5042. Internet: http://www.whitehouse.gov/wh/eop/cea/html/whitepapers.html
- **Council on Environmental Quality (CEQ)** Old Executive Office Building, 17th Street and Pennsylvania Avenue, N.W., Washington, DC 20502, 202-395-5042. Internet: http://www.whitehouse.gov/ceq
- **Office of Management and Budget (OMB)** Old Executive Office Building, 17th Street and Pennsylvania Avenue, N.W., Washington, DC 20502, 202-395-5042. Internet: http://www.whitehouse.gov/wh/eop/html/ombhome.html

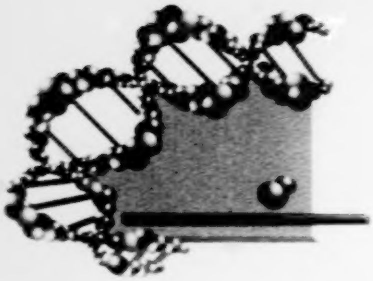


- **Department of Health and Human Services, National Institute of Environmental Health Sciences (NIEHS)** Building 101, Headquarters, P.O. Box 12233, Research Triangle Park, NC 27709, 919-541-3201. Internet: http://www.niehs.nih.gov
- **Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR)** Building 16, Centers for Disease Control and Prevention, 1600 Clifton Road, N.E., Atlanta, GA 30303, 404-639-7000. Internet: http://atsdr1.atsdr.cdc.gov:8080/child
- **Department of Health and Human Services, Centers for Disease Control and Prevention (CDC)** Building 16, Centers for Disease Control and Prevention, 1600 Clifton Road, N.E., Atlanta, GA 30303, 404-639-7000. Internet: http://www.cdc.gov; and Rhodes Building, Kroger Center, 3005 Chamblee-Tucker Road, Atlanta, GA 30341, 770-488-5401. Internet: http://www.cdc.gov/nceh/about/org/bddd.htm
- **Department of Health and Human Services, Office of Disease Prevention and Health Promotion (ODPHP)** Hubert H. Humphrey Building, 200 Independence Avenue, S.W., Washington, DC 20202, 202-205-8611. Internet: http://odphp.osophs.dhhs.gov
- **Department of Education (DoED)** Federal Office Building Ten, 600 Pennsylvania Avenue, S.W., Washington, DC 20202, 202-401-3000. Internet: http://www.ed.gov
- **Department of Labor (DOL)** Francis Perkins Building, 200 Constitution Avenue, N.W., Washington, DC 20210, 202-219-8271. Internet: http://www.dol.gov
- **Department of Justice (DOJ)** Main Justice Building, 950 Pennsylvania Avenue, N.W., Washington, DC 20530, 202-514-2001. Internet: http://www.usdoj.gov
- **Department of Energy (DOE)** Forrestall Building, 1000 Independence Avenue, S.W., Washington, DC 20585, 202-586-6210. Internet: http://www.doe.gov
- **Department of Housing and Urban Development (HUD)** HUD Building, 451 Seventh Street, S.W., Washington, DC 20410, 202-708-0417. Internet: http://www.hud.gov
- **Department of Transportation (DOT)** Nassif Building, 400 Seventh Street, S.W., Washington, DC 20590, 202-366-1111. Internet: http://www.dot.gov





- **Department of Agriculture (USDA)** Jamie L. Whitten Federal Building, 1400 Independence Avenue, S.W., Washington, DC 20250, 202-720-3631. Internet: http://www.usda.gov
- **Consumer Product Safety Commission (CPSC)** East West Towers, 4330 East West Highway, Bethesda, MD 20814, 301-504-0213. Internet: http://www.cpsc.gov



Glossary

The glossary is intended to assist readers in understanding terms used by the U.S. Environmental Protection Agency. The definitions are not all-encompassing and should not be construed as official EPA definitions. For terms not included in this glossary, the reader may refer to standard health science and medical textbooks and dictionaries.

Acute Exposure: Exposure to one dose or multiple doses within a short time—24 hours to a few days.

Acute Toxicity: A term used to describe immediate toxicity. Its former use was associated with toxic effects that were severe (*e.g.*, mortality) in contrast to the term "subacute toxicity" which was associated with toxic effects that were less severe.

Adverse Health Effect: Any change resulting in anatomical, functional, or psychological impairment that may affect the performance of the whole organism.

Aquifer: An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Allergic Reaction: Adverse reaction to a chemical resulting from previous sensitization to that chemical or to a structurally similar one.

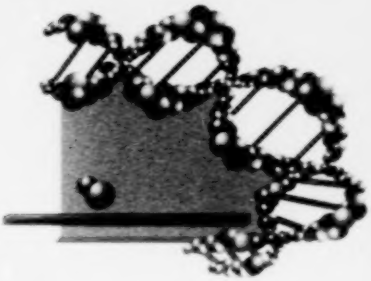
Asbestosis: Scarring of the lung from inhaling airborne asbestos fibers. This disease is often fatal.

Bioaccumulate: To build up a large amount of a substance in the body by ingesting small amounts of the substance over an extended period of time.

Cadmium: A heavy metal element that accumulates in the environment.

Carcinogen: Any substance that can cause or promote cancer.

Carcinogenesis: The origin or production of cancer (very likely a series of steps). The carcinogenic event so modifies the genome and/or other molecular control mechanisms in the target cell that they can give rise to a population of altered cells.



Chronic Exposure: Multiple exposures occurring over an extended period of time, or a significant fraction of the animal's or individual's lifetime.

Chronic Toxicity: A term used to describe delayed toxicity. However, the term "chronic toxicity" also refers to effects that persist over a long time, whether or not they occur immediately or are delayed.

Congenital: A condition existing from birth. Congenital conditions are acquired during development in the womb. They are not inherited from the parents.

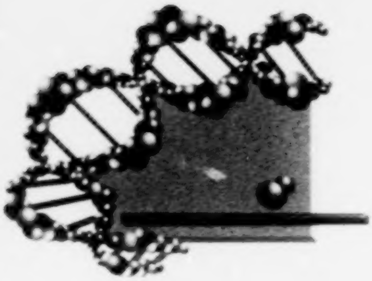
Cohort Study: An epidemiologic (human) study that observes subjects in different exposed groups and compares the incidence of symptoms. Although ordinarily prospective in nature, such a study is sometimes carried out retrospectively, using historical data.

Cumulative Risk Assessment: A process that involves the consideration of the aggregate ecologic or health risk to a target organism caused by the accumulation of risk from multiple stressors (any physical, chemical, or biological entity that can induce an adverse response) and multiple pathways of exposure.

Developmental Toxicity: Adverse effects on the developing organism (including death, structural abnormality, altered growth, or functional deficiency) resulting from exposure prior to conception (in either parent), during prenatal development, or postnatally up to the time of sexual maturation.

Dose: Administered dose is the mass of a substance given to an organism and in contact with an exchange boundary (*e.g.*, gastrointestinal tract) per unit body weight, per unit time (*e.g.*, mg/kg-day). Absorbed dose is the amount of a substance penetrating the exchange boundaries of an organism after contact.

Dose Response: How a biological organism's response to a toxic substance quantitatively shifts as its overall exposure to the substance changes (*e.g.*, a small dose of carbon monoxide may cause drowsiness; a large dose can be fatal).



DNA (deoxyribonucleic acid): The carrier of genetic information in cells.

Ecology: The relationship of living things to one another and their environment, or the study of such relationships.

Endocrine Disruptors: Exogenous (outside the body) chemical agents that interfere with the production, release, transport, metabolism, binding, or elimination of the natural hormones in the body, which are responsible for the maintenance of homeostasis and regulation of developmental processes.

Enteric: Relating to the intestines, alimentary.

Exposure: Contact of an organism with a chemical or physical agent. Exposure is quantified as the amount of the agent available at the exchange boundaries of the organism (*e.g.*, gut, skin, lungs) and available for absorption.

Exposure Assessment: The determination or estimation (qualitative or quantitative) of the magnitude, frequency, duration, and route of exposure.

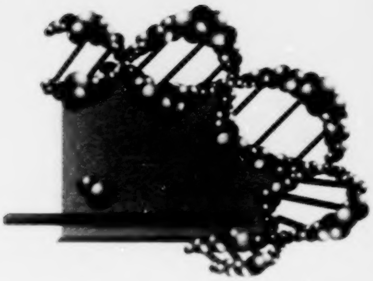
Ground Water: Water that moves slowly underground in an aquifer.

Hazardous Waste: Waste defined by the Resource Conservation and Recovery Act (RCRA) as those that may cause, or significantly contribute to illness or death, or that may substantially threaten human health or the environment when not properly controlled.

Health Advisory: An estimate of acceptable drinking water exposure to a chemical substance based on health effects information. A Health Advisory is not a legally enforceable federal standard, but serves as technical guidance to assist federal, state, and local officials.

Incidence: The number of cases of a disease or occurrence of an effect within a specified period of time.

Integrated Pest Management (IPM): A mixture of chemical and other non-pesticide methods to control pests.



Malignant: Tending to become progressively worse and to result in death if not treated; having the properties of anaplasia, invasiveness, and metastasis.

Maximum Contaminant Level (MCL): Maximum permissible level of a contaminant delivered to any user of a public drinking water system. An MCL is an enforceable federal regulation.

Metastasis: The transfer of disease from one organ or part to another not directly connected with it.

Mitigation: Measures taken to reduce adverse impacts on the environment.

Morbidity: Sickness.

Mortality: Death.

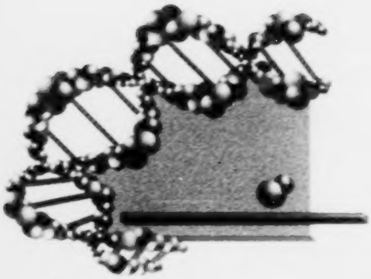
Nitrate: Plant nutrient and inorganic fertilizer that enters water supply sources from septic systems, animal feed lots, agricultural fertilizers, manure, industrial wastewaters, sanitary landfills, and garbage dumps.

Nitrite: Nitrite is an intermediate in the process of nitrification. Nitrous oxide salts are used in food preservation.

Particulate Matter: Airborne materials that can, depending on their size and composition, lodge in various areas of the respiratory tract.

Pathogens: Microorganisms that can cause disease in other organisms or in humans, animals, and plants (*e.g.*, bacteria, viruses, or parasites) found in sewage, in runoff from farms or rural areas populated with domestic and wild animals, and in water used for swimming. Fish and shellfish contaminated by pathogens, or the contaminated water itself, can cause serious illness.

Restoration: Measures taken to return a site to pre-violation conditions.



Risk: The probability of injury, disease, or death under specific circumstances. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that harm will not occur) to one (representing the certainty that harm will occur).

Risk Assessment: The determination of the kind and degree of hazard posed by an agent, the extent to which a particular group of people has been or may be exposed to the agent, and the present or potential health risk that exists due to the agent.

Smelter: A facility that melts or fuses ore, often with an accompanying chemical change, to separate its metal content. Emissions cause pollution. "Smelting" is the process involved.

Solvent: A liquid capable of dissolving a material and holding it in solution. For example, paint remover is a paint solvent.

Superfund: Federal authority, established by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, to respond directly to releases or threatened releases of hazardous substances that may endanger health or the environment.

Surface Water: Water at the surface of the earth, including lakes, rivers, ponds, and streams. It is the source of much ground water through the larger hydrologic cycle as water moves from the surface to aquifers below ground.

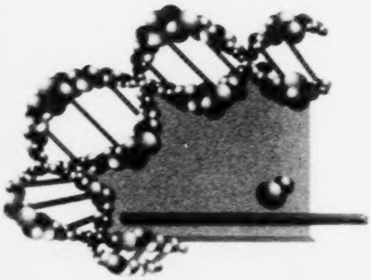
Toxic: Poisonous.

Toxicology: The study of the adverse effects of chemicals in living organisms.

Transboundary Pollutants: Air pollution that travels from one jurisdiction to another, often crossing state or international boundaries.

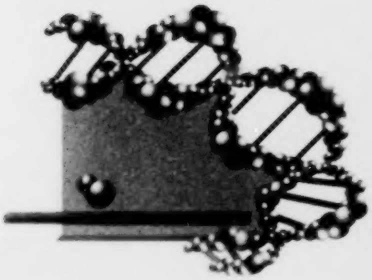
Volatile: Any substance that evaporates readily.

Vinyl Chloride: A chemical compound, used in producing some plastics, that is known to be carcinogenic to humans.



Acronyms and Abbreviations

AAP: American Academy of Pediatrics
AAP-PA: Pennsylvania Chapter of the American Academy of Pediatrics
AASA: American Association of School Administrators
AChE: Acetylcholinesterase
AHS: Agriculture Health Study
AID: U.S. Agency for International Development
AIRS: Aeromatic Information Retrieval System
ALA: American Lung Association
ALAEM: American Lung Association of Eastern Missouri
ALANYS: American Lung Association of New York State
ATSDR: Agency for Toxic Substances and Disease Registry
AWEsome!: Active Watershed Education
BBDR: Biologically-based dose-response
CCRI: Chicago Cumulative Risk Initiative
CDC: Centers for Disease Control and Prevention
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
CNS: Central Nervous System
CRITFC: Columbia River Intertribal Fish Commission
DEPM: Dietary Exposure Potential Model
EPA: U.S. Environmental Protection Agency
EPCRA: Emergency Planning and Community Right-to-Know Act
ETS: Environmental tobacco smoke
FDA: U.S. Food and Drug Administration
FCP: Fish Contamination Program
FIFRA: Federal Insecticide, Fungicide, and Rodenticide Act
FQPA: Food Quality Protection Act
GAO: Government Accounting Office
GREEN: Global Rivers Environmental Education Network



HHS: U.S. Department of Health and Human Services

HUD: U.S. Department of Housing and Urban Development

IAQ: Indoor air quality

IEUBK: Integrated Exposure and Uptake Biokinetics

IPM: Integrated Pest Management

IRIS: Integrated Risk Information System

JET: Junior Environmental Training

MMT: Manganese - methylcyclopentadienyl manganese tricarbonyl

MPRA: Multi-pathway risk assessment

MWC: Municipal waste combustion

NAFTA: North American Free Trade Agreement

NEA-HIN: National Education Association Health Information Network

NCHS: National Center for Health Statistics

NETI: National Enforcement Training Institute

NHANES: National Health and Nutrition Examination Survey

NIH: National Institutes of Health

NLM: National Library of Medicine

NPTA: National Parent Teachers Association

NPTN: National Pesticide Telecommunications Network

OCHP: Office of Children's Health Protection, U.S. Environmental Protection Agency

PAHs: Polycyclic aromatic hydrocarbons

PCBs: Polychlorinated biphenyls

PCDF: Polychlorinated benzodifuran

ppb: Parts per billion

PRGs: Preliminary Remediation Goals

RCRA: Resource Conservation and Recovery Act

RTK-NET: Right-to-Know Network

SDWA: Safe Drinking Water Act

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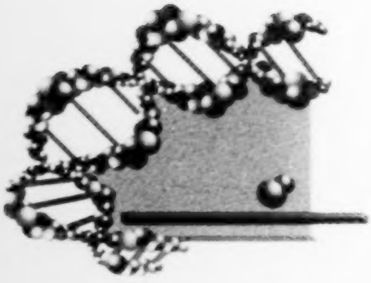


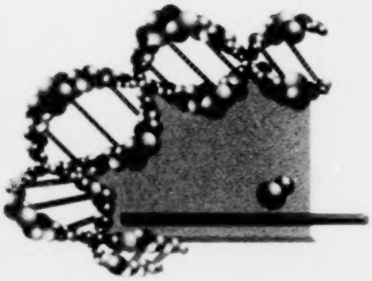
TRI: Toxic Release Inventory

TSCA: Toxic Substances Control Act

USDA: U.S. Department of Agriculture

UV: Ultraviolet light

VOCs: Volatile organic compounds



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Efforts to improve children's health protection are inextricably tied to EPA's initiatives to address environmental justice. Environmental justice concerns the disproportionate health risks to poor and disadvantaged communities resulting from their proximity to toxic waste sites, industrial sites, and incinerators or their residence in highly polluted urban environments or substandard housing. These projects are listed in the index below. A great number of EPA's children's health projects target urban environmental problems and tribal health threats. The focus on all children will continue to grow, reflecting EPA's firm commitment to the protection of children's health from environmental threats.

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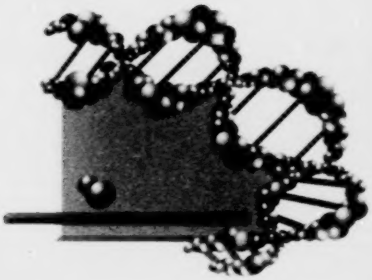

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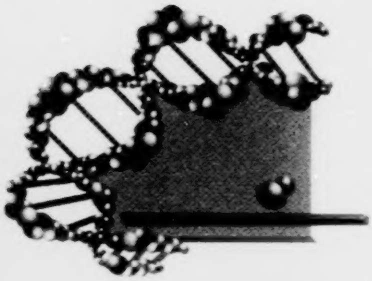

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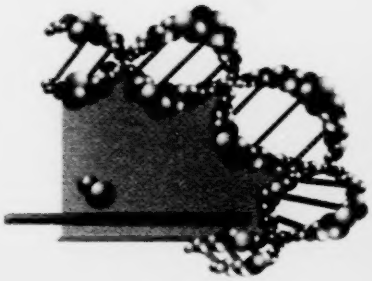

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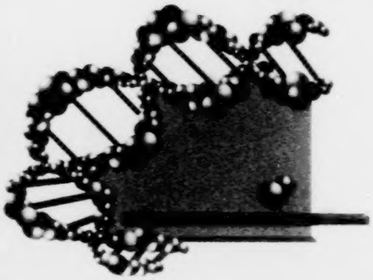

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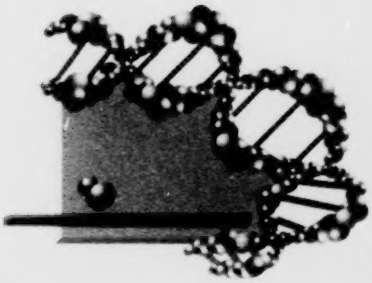

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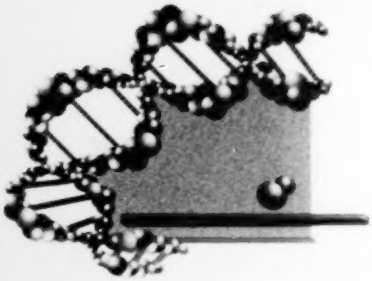

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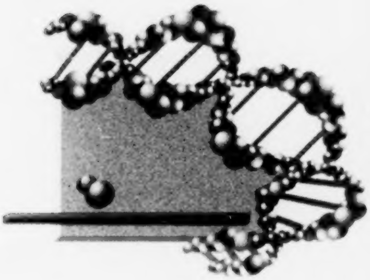

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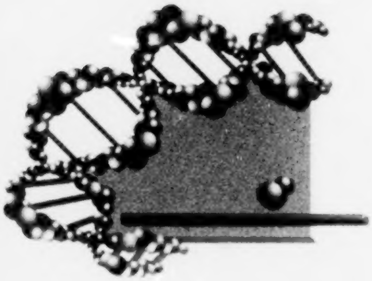

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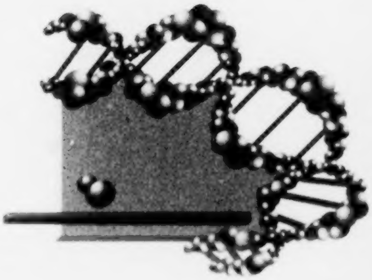

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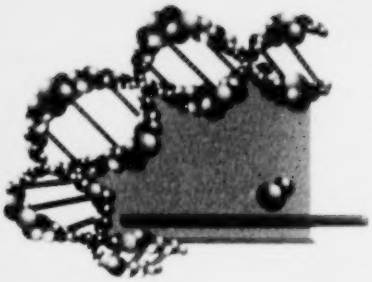

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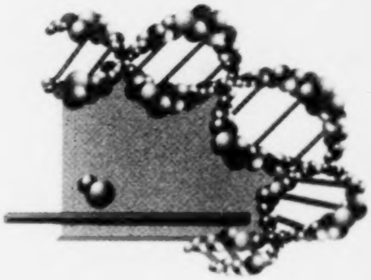

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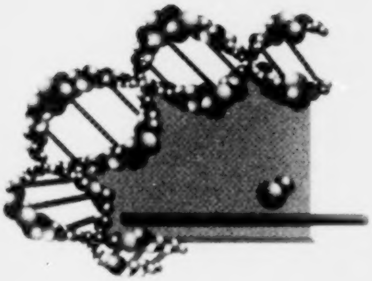

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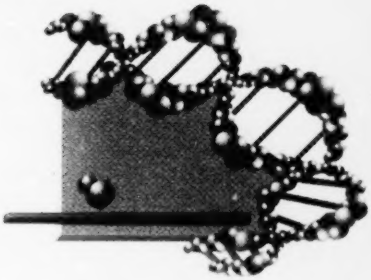

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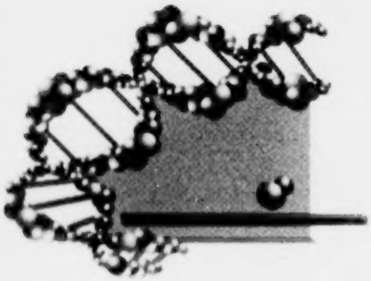

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